March 2009

Electronic Budget Information Sharing

Cordell V. Rogers
Worcester Polytechnic Institute

Nicholas Maraveilias Comeau
Worcester Polytechnic Institute

Serena R. Dubois
Worcester Polytechnic Institute

Electronic Budget Sharing:
A look into Management Control Systems

An Interactive Qualifying Project Report Submitted to the Faculty of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the Degree of Bachelor of Science by

Nick Comeau

Serena Dubois

Cordell Rogers

Date: March 6th, 2009

Report Submitted to:

Fabienne Miller, Ph. D.

Authorship Page

The group assumes all the responsibility for the authorship and editing of this report.

Nick Comeau

Serena Dubois

Cordell Rogers

Acknowledgments

The success of this project was dependent upon many people. For this reason, we would like to thank the many who helped and supported us in some way.

We would like to thank all the companies that allowed us to interview them and all the individuals that responded to our survey. We would also like to thank the WPI's Career Development Center for distributing our survey to companies. We also extend our gratitude to Christine Drew for providing assistance in research methods and survey design.

Lastly, we would like to thank our Worcester Polytechnic Institute advisor Professor Fabienne Miller for her guidance throughout our project.

Table of Contents

Executive Summary

In this paper, we investigate how companies share their budgets and financial information. We primarily look to see how they interact with management control systems. To do so we first looked at prior research on Management Accounting, corporate information sharing, corporate paper usage, the human aspect and how it relates information technology, as well as some of the available options for management control system technologies.

Background

We found that management accounting has evolved over the past 150 years. As business grew from the sole entrepreneur to massive international companies, management accounting became more complex and at the same time more necessary for operational strategy. Over time the technology used for management accounting also evolved. Then with the advent of computers, and then the internet, this evolution rapidly grew. This had differing effects on paper usage and security for the firms that used management accounting to allocate resources effectively.

Companies use a lot of paper on a regular basis; in this paper we explore the possibility of Management Control Systems helping to reduce the amount of paper that a firm uses. Our background research showed that though Management Control Systems (MCS) can help reduce the amount of printing since budgets and other documents can be viewed on the computer, these systems can sometimes increase the amount of paper that a firm uses due to how much it facilitates printing for employees. When reducing paper usage, companies not only minimizes the cost of paper, ink, and toner, they also minimize the security risks associated with storing financial information on paper.

When choosing any software, we found that it is valuable to assess employees' resistance to change and see how well it will integrate. Doing so will determine the MCS option that the firm chooses. We discuss Extensible Business Reporting Language (XBRL), Enterprise Resource Planning (ERP), SAP ERP, Intranet, Electronic Data Interchange (EDI), and off the shelf accounting software as options for Management Control Systems. There were some factors that make some of these software packages more adaptable to different firms.

From this background research, we constructed the following questions:

1. Does having an electronic budget information sharing system influence paper use?
2. Does the length of the budget have an effect on the amount of times employees print?
3. How well does the presence of a paper conservation policy cause a firm to print less?
4. How does employee position affect involvement with the budget and how does it affect satisfaction with the electronic budget information sharing system?
5. How does financial information security impact employee satisfaction with the budgeting system?

After conducting our research, we developed the following exploratory questions:

1. Are people generally confident that their company's financial information is secure?
2. How does the industry effect employees perspective towards security and the company's attitude towards paper consumption in regards to financial information?

This report details interesting results in answer to all of these questions.

Research Methodology

To answer these questions, we used interviews and a survey to gain more information about our topic. The survey was distributed to 460 individuals through online survey software named Qualtrics. We selected four companies based on size and industry to interview. We choose different types of companies so that we could compare and contrast the information we obtained from the interviews. Our quantitative data analysis was largely based on statistical analysis such as t-tests, regression, descriptive data, and ANOVA. For our qualitative analysis, we examined the transcribed interviews, applying different methods to interpret the data. Some of these methods included content analysis and hermeneutical analysis.

Results & Conclusion

Particularly interesting results from our survey and interviews include the following:

1. Many people were dissatisfied with their Management Control System.
2. Most companies have a computerized budgeting system.
3. Few employees felt strongly that their company had a paper conservation policy in place.
4. Cost seemed to be a big detractor from the appeal of implementing a Management Control system.

In our conclusion, we suggest ideas for future researchers; most notably we suggest more research on how a MCS can affect a firm's profitability.

Introduction

Information sharing is prevalent in business operations. Information is shared both internally and externally on a day-to-day basis. This project focuses on the sharing of financial information internally, more specifically the budget. The budget is used to plan the proper allocation of resources. It is a measure of not only how firms perform, but how they communicate goals within the firm. Budgets also motivate and monitor achievements in one course of action. Sharing the budget is a necessary tool to facilitate intercommunication regarding managing expenses between different levels of a firm.

There are a variety of ways the budget can be shared. Traditionally, copies of the budget were printed out and hand delivered to departments within the company. With the advancement of technology, the budget can now be sent to hundreds of personnel with the click of a button. Management control systems allow firms to share information between accounting, the firm as a whole, individual departments, and employees. Although management accounting systems are being adopted at an increasing rate, there are factors such as ease-of-use, security, and paper usage which may influence if a management control system is satisfactory for different companies.

With research tools such as interviews and surveys our team is going to answer the following five research questions. First, we investigate whether having an electronic budget information sharing system influence paper use. Second, we examine whether the length of the budget has an effect on the amount of times employees print. Our third research question asks how well the presence of a paper conservation policy causes a firm to print less. Fourth, we turn to how employee position affects involvement with the budget and satisfaction with the electronic budget information sharing system. Finally, we study how this information security impacts employee satisfaction with the budgeting system. We further conduct an exploratory analysis of whether the industry affects employees perspective towards security and the company’s attitude towards paper consumption in regards to financial information. We will

answer these questions with the following chapters. Chapters 1 and 2 are the background and literature review which define prior research that has been done on the topic and provides a foundation for our research questions. Chapter 3 is the methodology which describes techniques we used to collect our data and the instruments we used for data analysis. Chapters 4 and 5 are the results which describe in detail how we analyzed our data. The final section, Chapter 6 contains our discussion and conclusions.

1.0 Background Chapter

The purpose of this project is to gather pertinent information to make recommendations to businesses related to the integration of software used to share managerial accounting information. We will start with some background research on the three key intertwined topics: management accounting, information sharing, and minimal paper usage.

1.1 Management Accounting

The first topic, management accounting, can be defined as "the means by which senior executives communicate to subordinate and decentralized managers the goals and objectives of the organization. In the reverse direction, the management accounting system is the channel by which information about the firm's product performance and production efficiencies get reported to upper levels of management"(Johnson & Kaplan, 1987). This is the way that companies can communicate expectations and why the production did or did not meet expectations. Management accounting provides the data that helps leaders make important decisions about increasing the profits for the next reporting term, allocating resources and planning. To retain their competitive edge, it is imperative that businesses across the board capitalize on the skills offered by their management accountants (In Business, 2008). Management accounting has continued to develop and accommodate for increased needs in the business industry throughout the years.

In the 1800s, there was no need for management accounting. It was the sole entrepreneur selling goods for more than it cost him. He just needed to keep track of money he was giving out from purchasing and balance it with the money coming in from sales (Edwards & Newell, 1990). After the Industrial Revolution, there was a need for "managed hierarchical organizations" in order to manage resources. Around the 1850s, the railroad and telegraph infrastructure created

even more of a need for advanced management accounting to accommodate for an increase in distribution activities (Hoskin & Macve, 2000). In the 1900s, several companies were vertically integrated. This allowed for large growth for companies like General Electric. These companies were now performing multiple operations that were typically done by individual companies all under one company. This created the need for more complex management accounting systems. In the 1920's General Motors was doing poorly because it was being mismanaged. Once new management was implemented, GM began practicing "centralized control with decentralized responsibility" and formed a multidivisional structure (Johnson & Kaplan, 1987). This took some innovative management accounting.

Management accounting soon answered the demand for enhanced control for multidivisional structures with new technologies. Digital computers were the first step in this direction in the 1960s. At this time, cost systems became automated and integrated into management accounting systems. During the 1970s companies began to implement software packages that were tailored individually for companies' needs. Throughout the 1990s, companies slowly substituted their outdated systems with Management Control Systems (MCS). MCS can be defined as "formal, information-based routines and procedures managers use to maintain or alter patterns in organization activities" (Simmons, 1995). These systems are used by businesses, more specifically management to support and influence strategic processes within the organization (Langfield-Smith, 1997). Currently, there are developing technologies in electronic communication used to operate the management control system. The pace and development of these technologies in the last decade has increased drastically (Grandlund & Mouritsen, 2003). These new technologies make it possible to explain the accounting operations and make information readily accessible to managers when necessary.

1.2 Information Sharing

Information sharing is the reason why MCS are significant to management accounting. MCS are necessary to allow a channel of information to exist amongst the accounting department, management and employees. The interchange of information whether subtle or concrete, forms the basis of all organizational activity (Barret & Konsynski, 1992). All firms need to have the necessary tools to be able to adapt to organizational change (Kloot, 1997). MCS are designed to ensure that the organization adapts to changes in its environment. The

following section will further discuss how management accounting and paper play a role in information sharing.

According to Ferrante (2006) a large amount of accounting information is shared within a firm. Some examples are the budget, expense reports, income statement, balance sheet, and statement of cash flows. The budget is predominantly the most shared piece of accounting information because this managerial financial information increases workers' trust in management (Ferrante, 2006). According to Parker and Kyj (2006), budget participation will increase an employee's information sharing with his or her superiors (also known as vertical information sharing) and will also increase organizational commitment. Their research also shows that upward information sharing has a positive relation with job performance (a relation they found to be statistically significant), which includes enabling the superior to make better strategies for the subordinate and ensuring that the subordinate receives adequate budgetary support (Parker & Kyj, 2006). The budget provides a motivating factor for the employee to out-perform his or her personal goals, along with the goals of the company.

There are many methods that firms use to prepare and share their budget. In some companies, all budgets are presented by the budgeting executive, who supplies supplementary information and gives recommendations. In other companies, a budget committee, rather than the chief executive, reviews the budgets (Roberts, 1979).

The budget is an important accounting tool used to measure and improve performance in a business. A commonly shared budget, the operating budget presents a plan for the coming year and provides information and updates throughout the year regarding the progress towards these goals (Lebas, 1995). Other budgets which are shared often include the capital budget, project budget and cash flow budget. In order to increase the likelihood of these desired results, it is important that managers have a clear understanding of the goals and restraints explained in the budget. An efficient MCS is an effective solution to ensure a clear line of communication between accounting and management. MCS' are not only helpful to organizations due to their role in information sharing but they can also assist in decreasing paper use in management accounting.

1.3 Paper Use and Security

According to a 1997 US Survey "About 94% of all business information is still recorded on paper, with an estimated 2.4 billion new sheets placed in paper file folders each day" (Stork & Ziming, 2000). Most firms don't consider their paper waste significant. But realistically the significance of even a small firm's paper waste impacts the environment more than one would think, especially when looking past the individual scale. Management accounting technologies reducing paper would be a large step in the right direction for cutting down on paper waste (Jasch, 2003). The less paper these firms use, the less harm is done to the environment. In 2007, "U.S. companies printed 1.5 trillion pages, according to research firm IDC. That's a 95,000-mile-high stack of paper, or the equivalent of 15 million to 20 million trees" (Hesseldahl, 2008). Even if one uses recycled paper, the cost of paper and ink is very high in comparison to sharing that same document electronically. The article No More Metal File Cabinets (2004) reported that the estimated yearly cost of an accounting firm's use of paper is $29,640. The estimated yearly cost of storage, labor, and toner is $3,769. From these numbers we cannot specifically identify how much paper is used by management accounting. Yet, we can assume that similar results exist for management accounting separately. These figures suggest that companies with minimal paper usage not only save the environment, but can significantly save money and time. Also, using paper means that confidential information must be physically hidden or shredded when not in use.

With an abundance of paper in the workplace it is very simple for a malicious person to gain access to a hard copy. "Large organizations lose one document every twelve seconds" (Sherbon, 2004). In a MCS, it is very important that any information entered into the system remains secure. File cabinets and safes exist to secure paper data but an even more efficient way to secure data is to store it electronically (Salmi & Vahtera, 1994). Electronic information is allowed to be protected by passwords and be closely monitored. Technologies like Secure File Transfer Protocol (FTP), Firewalls and Secure Socket Layer (SSL) exist to allow for protecting electronic data. These options show that shifting away from paper usage is not only environmentally friendly, but also helps to protect data. This concludes our background research, in the next section we review more sources, which will help us form our research questions.

2.0 Literature Review Chapter

2.1 Advantages and Disadvantages of a MCS

Employing a MCS enables reduction of costs, saving the environment, and creating a competitive edge in the business world (Massie, 2008). Although minimizing costs and improving efficiency are high priorities for companies, putting into action a MCS can also create problems for a company. The following section is going to discuss possible advantages and disadvantages in which MCS' can play a role in. This includes saving money, protecting the environment, and organizing information.

2.1.1 Financial Costs

An automated solution creates a severe decrease in document processing and storage (Massie, 2006). 10,000 pages of paper (the equivalent of a full four-drawer file cabinet) can be stored on one compact disc. In addition, hard copy information can easily be misplaced (Chudnow, 2001). On average an executive spends three hours a week hunting for lost documents (Sherbon, 2004). As stated in section 1.3 accounting firms spend on average $29,640 on paper, and $3,769 on toner, storage and labor. In contrast, as much as reducing paper cuts costs, it can create them too. The costs mainly come from putting into operation a MCS. Some of the major expenses would be purchasing the system, a proper document scanner and installation of the MCS (Yusof & Sidhu, 2001). Also there are ongoing costs for maintenance and employing professionals to supervise the system. In addition to all these costs, there may be costs associated with destroying the hard copy documents. Not only are there financial costs but also potential environmental costs caused by a MCS.

2.1.2 Environmental costs

Though a MCS can lead to a reduction in paper usage (see section 1.3), it can also have adverse effects depending on how it is utilized. The introduction of e-mail into an organization caused, on average, a 40% increase in paper consumption (York, 2006). This statistic suggests a correlation between the increase in electronic data storage and an increase in paper use. We

believe this may occur due to how easy an electronic data storage system makes it to print. In addition, studies show that more paper is consumed in developed countries. Countries such as the United States have more technological options for going paperless than underdeveloped countries, yet we use much more paper. While a MCS can sometimes increase or decrease the amount of paper usage, it typically improves the organization of a firm's information.

2.1.3 Information Organization

Approximately 80 percent of the information in a firm is unstructured and scattered (Massie, 2008). A solution that improves the organization of information within the company will also improve the operations and efficiency. This is particularly significant in management accounting due to the need for effective internal operations to enable information sharing (Johnson, Kaplan, 1987). Management accounting and even more specifically, budgets, are best utilized when the documents are easily filed, retrieved and shared. A proficient effective MCS can give management the tools to create a competitive edge. Alternatively this same structure can cause turmoil in the office. One of the greatest fears of accountants is losing control of their documents (Mongeon, 2008). Without careful consideration of how documents should be filed, stored and categorized, it can be hard for employees to remain in control of their information.

2.2 Technology for Information Sharing

An organization's management accounting system must provide timely and accurate information to facilitate efforts to control costs, to measure and improve productivity, and to devise improved production processes (Johnson & Kaplan, 1987). Accounting technology is not only applicable to financial data; it is a fundamental change in how one works in a firm and as a professional (Keenan, 2008). From an article in *Financial Management*, Glynn Lowth talks about how the use of Business Intelligence (BI, also referred to as decision support technology) "in industries that accumulate a lot of customer data - banking and aviation, for instance - helps to gain a competitive edge" (2008, p.1). As this technology grows and is developed further, it is also becoming more cost-effective for a wider range of sectors and for smaller companies as well (Lowth, 2008). Not only can technology help a firm's operations, but it can also facilitate the management accountant's role in sharing information. If technology can provide information more efficiently, then management accountants would be free to provide decision support (Lowth, 2008). Before a technology can be adopted there are a variety of factors to consider,

including human adaptation and firm culture, that can influence employee's willingness to accept any changes in their work environment.

Innovative technology is an excellent way for a firm to gain a competitive edge on other companies (Lowth, 2008). However, without an employee base that is familiar with this technology and willing to actually use it, it is less effective. A firm's greatest assets are the talents and collective knowledge of its people (Keenan, 2008). Human factors, characteristics that decide how an employee will react to certain situations, play a large role in information sharing

In 1994, two professors from Carnegie Mellon and one from Boston University conducted a series of experiments in order to report an investigation of attitudes about information sharing in a technical context (Constant et al., 1994). These experiments showed that support for the idea of sharing information decreased as people showed a greater interest in themselves. However, feelings people have about the work they do within and for their company can affect and in most cases promote attitudes favoring sharing. Believing information sharing is "normal" or necessary will promote the actual communication of information. An organization may put in place rules or "norms" that employees must follow in order to work for the company. These norms can indirectly promote information sharing by making employees believe it is what they are supposed to do. The exchange of information products can be considered a public goods problem (Constant, 1994). People who normally share information products may be less likely to help others because they feel overwhelmed by the amount of requests they receive. A solution to this is the development of a culture of good citizenship (Constant, 1994) where workers share information not because they are required to do so but because there is something in it for them. The best way to promote the sharing of expertise related information is for companies to create occasions where conversation is normal and frequent and the exchange of knowledge occurs regularly. These occasions help build good employee-to-employee relationships and trust. Inter-organizational meetings and electronic network sharing are excellent ways to increase these opportunities (Velez, Sanchez & Alvarez-Dardet, 2008). Trust plays a large role in information sharing, and when it comes to inter-organizational relationships, a new MCS can build that trust (Li, Valacich & Hess, 2004). On the other hand, resistance to change is a characteristic that can reduce trust.

Research undertaken by Maurer (1996) indicated that one-half to two-thirds of all major corporate change efforts fail, and resistance is the "little-recognized but critically important contributor" to that failure. This is particularly true during the implementation of MCS due to the technology involved. Without proper employee training using an information sharing system can be troublesome (Sumner, 1999). It can also cause concern in the work environment that older individuals may be replaced by more technically inclined applicants that are familiar with the software and don't require training. Although resistance can be considered a negative attitude in the work place, it is management's responsibility to listen to the employees needs before the final decision to implement any software. "Resistance plays a crucial role in influencing the organization toward greater stability. While pressure from external and internal environments continues to encourage change, resistance is a factor that can balance these demands against the need for constancy and stability" (Sohal, 1998).

Generally, technological progress proceeds at a slow and measured pace, with only incremental improvements seen in existing products and technologies in the economy (Hornstein, 1991). At times though, there can be a revolution in technology and this can cause a drastic change in the use of existing technologies. If a company wants to improve their operations, the use of technology in the accounting world is essential. Information technology is still seen as a powerful force enabling radical new designs for organizations (Robey & Boudreau, 1999). And as powerful as it may be, it will take some time for employees to adjust to the new technology, just as it will take time for new technologies to make their way into the accounting world.

Overall the application of technology in accounting systems, whether it is new, used or old, can help a firm in its processes. Firm culture is a relevant factor that helps determine the amount of information sharing within a firm. The human factor can be overcome through careful and patient implementation of a management system that allows for this change to occur deliberately and at a pace that employees are willing to accept. This can have an impact on which technology is chosen, next, we talk discuss some of these options.

2.3 Management Control System Technologies

In this section, we refer to the technology used to facilitate this task. Included are off the shelf accounting software, Extensible Business Reporting Language (XBRL), Enterprise Resource Planning (ERP), SAP ERP, Intranet, and Electronic Data Interchange (EDI).

2.3.1 Off The Shelf Software

Accounting and financial activities account for a large portion of IT usage by small businesses (Riemenschneider, 1998). There are multiple types of off the shelf software that firms are able to purchase. Some examples of this software are: Doc Easy, Business Works, Peach Tree, and Quickbooks. This software can come with many advantages such as ease of use. Since these are all generic and are not individually tailored to each separate company that uses it, implementation does not take a lot of time or money. Most software packages such as these are offered at a reasonable price to businesses. Also they are not overloaded with unnecessary tools that distract and further confuse users (Buchalter, 2007). Software developers are available and glad to provide support to businesses. They also are constantly upgrading and improving features on their software (Haas, 1995). According to Intuit, a growing number of small and medium size enterprises are removing traditional ERP packages in favor of Intuit's QuickBooks Enterprise Solutions (Thomas, 2007). Although this software is user friendly, one of the drawbacks is it cannot be tailored individually to each company. Also, off the shelf software requires more input by the user where as more complex MCS are more automated. Another disadvantage of off the shelf software is that some, such as Peach Tree do not allow you to collect information from a closed fiscal year (Ashpole, 2004).

2.3.2 Extensible Business Reporting Language

XBRL is a specialized form of extensible markup language (XML) and is becoming more familiar to creators and users of electronic financial statements. Although it is a very useful application, few people have actual hands on experience with it. Garbellotto (2008) states that adding XBRL technology will help executives and their companies become familiar to the technology at a small price. In XBRL, not only is the information displayed easily, but it also can be manipulated by using any hardware or software package that is XBRL-enabled, a feature that exists on over 20 current software packages (Pinsker, 2003). The XBRL Global Ledger (GL) taxonomy framework is technology used for internal reporting and sharing. "It can be used to standardize anything from entries, transactions, and documents up to sub-ledgers, ledgers, trial balance, and the links between all these and multiple types of end reports, both internal and external" (Garbellotto, 2008).

Processes in management accounting can be facilitated through XBRL because of its automation. Also, XBRL may reduce the costs incurred to a firm because of its management

accounting responsibilities. Large businesses are likely to incur higher implementation costs as they add XBRL capabilities to their existing information systems to enable them to comply with regulations that require them to report in XBRL format. But, in the long run, XBRL will facilitate the operations of business intermediaries, and will reduce the costs (Weber, 2003). XBRL has the potential to revolutionize how we analyze and view financial data, as well as serve as an efficient way of reporting the data as management accounting becomes increasingly automated. In the next section, we discuss Enterprise Resource Planning Systems.

2.3.3 Enterprise Resource Planning

ERP systems are software packages that facilitate business processes including finance and production, human resources, among others (Esteves & Pastor, 2001). ERPs are a type of MCS with multiple facets. One of the capabilities is to help management accountants make decisions with regards to allocating resources. A study by the Controller's Report showed that "Best-in-Class Companies Lower Administrative Costs by 15 Percent With ERP". The investment in and ERP system shortened basic administrative tasks and lowered investments in inventory and even improved customer service (Controller's Report 2008). There are a multitude of reasons why companies remain resistant to changing over to completely ERP. One of these reasons is security vulnerabilities. This includes the possibility of physical damage to the system, and people adding bad data to the system which may ruin the data integrity (Gullkvist, 2002). Another drawback of using ERP is installing and implementing it. ERP software can be very expensive (in the millions of dollars) to install. This can be a restriction to small businesses as they may not see ERP as a worthwhile investment and decide to forego this option altogether (Scapens, 2003). Another problem with ERP is the expense associated with implementing it. Some firms would have to support "occasional users" – managers who use the system once or twice a year. This would mean that the manager would become unfamiliar with the software in between uses and a one-time-training may not suffice, therefore requiring the manager to be retrained to operate the software correctly (Scapens, 2003). Also, ERP systems do not consistently provide the exact needs for the business. This reflects problems of not having enough capabilities, or being too expensive with useless capabilities. Some businesses find good workarounds to this option however, by making best-of-breed systems. These are customized systems that allow for a company to integrate two or more different software packages.

SAP is a German software company which produces a complex kind of ERP software. One of its capabilities is that it allows for globalization of firms that do business internationally. Scapens (2003) discussed a company running into trouble while implementing SAP ERP. One of the issues included people resisting change from the old system they were using. During the transfer, some of the data was corrupted, while other information went missing or, got put in the wrong area. An interesting reason people were hesitant to adopt SAP ERP included the idea that some people may lose their jobs due to the implementation of this new software making their jobs obsolete. Because of the sophistication of the software, it also was not easy for current employees to operate. These customized systems can also have the obstacle of being too expensive (Scapens, 2003). Intranets are a less expensive tool that some companies use as a MCS solution.

2.3.4 Intranet

Intranets may simply be defined as the use of internet technologies for private use. Typical tools used for access to the World Wide Web, like web browsers, may be used, but the difference is that they are restricted for use by the prescribed users only. They are preferred over other organizational tools because of their relatively low cost. Due to the influx of open source software available, the software necessary to implement them can be free or inexpensive (Dasgupta, 2001).

The security issues that arise with intranet include attackers from external sources. There are documented ways to combat this threat. Firewalls are tools that can be used to keep malicious content out of the system. They are put in between the intranet and the internet to keep out attackers. Data encryption methods are used to keep private data secure (Dasgupta, 2001). There is also software that scans for existing malicious software, and others that detect intrusion before it becomes a problem (Oppliger, 2002). However, all of this could be circumvented if users forget to protect their client PC's. The attackers could gain access to the system since the PC is equipped to go past all of the external safeguards. This problem can be avoided by password protecting the PC's (Dasgupta, 2001). In the next section, we discuss a MCS technology with a more specific functionality.

2.3.5 Electronic Data Interchange

According to the Minnesota Department of Labor and Industry EDI Implementation Guide (Minnesota, 2008), EDI is a method of exchanging data electronically. It facilitates the transfer of documents from one computer system to another. It makes transactions easier by automating the processes. The internet has made EDI even more convenient by making the exchange more cost-effective. Some advantages of EDI include improved accuracy, reporting performance, time and cost savings, and the enhanced flexibility.

HKM, a motion picture and television commercial production company, used EDI to help it manage its transactions as it grew in revenues and expenses. They had more commercials to make which increased the number of transactions, which in turn increased the amount of checks that they had to write monthly. This made their current computer system for communicating with banks inadequate and inefficient. They implemented an EDI that was focused on interchanging data between a bank and its clients. A problem they ran into is that EDI didn't comply with the standards for data that banks used, and this required customization on behalf of HKM's EDI vendor, Datatech (Lyons, 1995). The need for customization may be a financial issue for some businesses, though, as they may lack the necessary funds.

2.3.6 Summary of Technologies

Generally speaking, a big barrier for firms when it comes to making the decision to adopt technology includes the price of installation. Even after they install it, the price for integration can be unbearable due to the cost for training employees to properly operate the software.

For business, XBRL, ERP, SAP ERP, Intranet and EDI, and off the shelf software are among the options. A similarity among all of these technologies is that they have security vulnerabilities that must be addressed. All of these tools provide an electronic alternative to paper usage. Other then the intranet, they are all apparently widely used by the accounting industry already. They all require some degree of technical knowhow to set up and use, but the intranet is the least complex, since it is very similar to the internet in appearance and experience (Dasgupta, 2001). The intranet is also the system with the lowest cost, as the implementation and utilization tools are widely available and the low complexity allow for employees to be trained using less company time. XBRL is exclusively for accounting purposes. ERP is flexible for any kind of resource planning, including for management accounting. A step above that, EDI is flexible for any kind of data interchange. The advantage of intranet is that it may be used for

any kind of information flow. This allows for the company to adjust the intranet to its particular culture and use this intranet to provide facilitation for other types of organizational information sharing. In regards to the flow of information, Scott (1998) praises the intranet for its pull rather than push style that allows for necessary data to be shared without an information overload.

2.4 Background Summary

The demand for management accounting has increased over time. This demand increase coupled with the rise of computer technology has allowed MCSs to become more prevalent in business operations. These MCSs help firms share information both internally and externally. When implemented well a MCS is able to improve management accounting communication.

A clear channel of communication needs to exist not only between accounting and management, but also across the entire organization. Electronic information sharing allows for information to be shared among multiple levels of the organization. Information such as the budget is able to communicate the company's goals and measure the success in attaining them. When implementing a MCS some factors need to be considered: cost, paper usage, and the organization's and employees' resistance to change. There are various types of MCS available for firms' use; these include but are not limited to: XBRL, ERP, SAP ERP, Intranet, EDI, and off the shelf accounting software.

2.5. Research Questions

Management and budget sharing operations can be affected by paper usage, employee satisfaction, and information security within the company. With our collected survey data, one of the questions we plan to address is, **does having an electronic budget information sharing system influence paper use?** For this question we predicted that there was a relationship between average number of pages printed per day and the electronic budget system.

When considering specific documents such as the budget, we can inquire whether or not the **length of the budget has an effect on the amount of times employees print**. For this question we predicted that there was a positive relationship between the length of the budget and amount of times employees print. Both these questions involve employee paper use without the company in mind.

Our third research question asks **how well the presence of a paper conservation policy causes a firm to print less**. We predict that if a company has a paper conservation policy, then the number of times employees print the various budgets will be lower than if the company does not have one. Proposed this way, we can gain insight on whether or not a company promotes saving paper from employee opinions, rather than the company itself, which may acknowledge the presence of an environmental policy just to promote the organization. Using employee opinions allows us to understand paper use from the ones who are actually involved in budget printing.

Our next research question entails budget involvement and employee satisfaction. Certain questions in our survey group respondents into categories depending on their job titles, responsibilities, and length of employment. We want to determine if these factors influence access to company budgets, involvement with specific budgets, and satisfaction with the budgeting system. More broadly, **how does employee position affect involvement with the budget and how does it affect satisfaction with the electronic budget information sharing system?** We predict that employee level, employee role, and length of employment affect the access to the budget, the involvement with the budget, and satisfaction with the electronic budget information system, with no prediction as to the direction of the relationships.

The last factor, information security within the company, involves how the company protects its financial information and how assuring that protection is to the employees. The form of security a company has is analyzed by the number of security measures used. **How does this information security impact employee satisfaction with the budgeting system?** Within that question, we can ask if there is a relationship between satisfaction and how confident the employee is that their company's financial information is secure? We predict that the more security measures that a company has in place to protect its financial information, the more satisfied the employees would be with the budgeting system.

In addition to these research questions, we have developed some exploratory questions from which we believe significant relationships can be determined. The first exploratory question asks: **Are people generally confident that their company's financial information is secure?** We predict that because of today's technological advancement, people will be confident about their company's security. The second question goes back to our original categorization of

breaking down responses into the type of industry their company is in. Within these groups, we can measurethe differences in the number of times budgets are printed, the presence of a paper conservation policy, and type and confidence of information security measures. **How does the industry effect employees perspective towards security and the company's attitude towards paper consumption in regards to financial information?** Since we do not have any background research on this we do not have any predictions for this question.

While conducting this research, we plan on discovering how firms interact with MCSs and the budget. There are many different types of budgets shared; our goal is to develop an understanding about what factors influence the budget sharing process. We are interested in learning what MCSs different companies utilize. In addition to the ones we listed, we would like to learn more about other software firms use for management accounting. We would also like to find how satisfied they are with their current software. Another goal was to see if having an MCS helps a firm minimize paper usage. We also expect to learn how important information security is in a corporate setting. Furthermore, we are interested in understanding the reason behind choosing whether or not to implement a MCS. To achieve these learning goals, our next section will discuss the methods we used to gather information.

3.0 Methodology Chapter

3.1 Introduction

In order to understand how different firms utilize management control systems, we have come up with the following objectives:

- Objective 1: Evaluating the relationship between how information, more specifically the budget, is shared and the integration of an MCS
- Objective 2: Evaluating the overall satisfaction a firm has with their MCS
- Objective 3: Evaluating the relationship between paper usage, security, and the integration of an MCS

The following chapter will describe how we approached gathering the information we need in order to complete our objectives.

3.2 Types of Methods

The methodology is based on methods we determined would be effective in evaluating the process used within companies to share budgets. In order to complete our objectives, we used two methods of data collection, conducting interviews and administering surveys. The word survey is most often used to describe a method of gathering information from a number of individuals, a "sample," in order to learn something about the larger population from which the sample has been drawn (Ferber, 1991). On the other hand, interviews are conversations with structure and purpose that are defined and controlled by the researcher (Kvale, 1996). They allow people to convey to others a situation from their own perspective and in their own words. We decided on using both the survey and the interview questions to get a wider range of information. Another reason we used survey and interview questions is the inaccuracy both can have. When individuals answer interview questions face-to-face there can be a reluctance to answer questions honestly or to disclose information. So surveys are a good alternative for getting information that is not sensitive to the interviewers approval or disapproval (Tourangeau,Rasinski & Rips, 2000). Also, surveys allow for us to reach a larger sample size at a more cost-effective rate. It would not be feasible for us to interview all of these respondents individually in the span of time we have for this project. The survey also allowed us to reach respondents from a variety of industries and varying positions within their company. When deciding on how to design our surveys we had to examine the situation and figure out exactly what we wanted to accomplish from administering these surveys. We needed to see what information is valuable for us to analyze and what form the information needs to be in.

3.3 Survey

3.3.1 Survey Design

When writing surveys it is crucial to use conventional language. This requires using complete sentences. Like slang, fragments give off an informal air and are not appropriate in a professional setting. We also needed to avoid using abbreviations. These can be very confusing, especially when writing to respondents who may or may not be familiar with our abbreviation. Similarly, “lingo” or technical expressions can be confusing to those who are not in the field that the lingo is relevant for, or those in the field that have not kept up to date with the jargon (Fink, 2008).

In the survey, we decided to use a majority of closed questions. Closed questions have limited responses provided for the survey respondent. This type of question takes more effort to write than open questions, which allow the respondents to write their exact answer. It is worth the extra effort because we want standardized answers to be able to compare the results between respondents and analyze them better. Closed questions provide the standardization necessary to analyze the answers (Fink, 1995).

In addition, we used questions with nominal answers to categorize the respondents as well as determine demographic information. We also had some questions in the form of a likert scale to gauge respondents' feelings and opinions about topics. We asked questions where there could be a variation in how a person felt that was more sophisticated than what a yes/no question could support (Britannica, 2008). While creating the survey we wanted to make sure we were thorough with the content and number of questions. To minimize the reluctance to respond we had to ensure that the survey was not too long. As the length of the survey increases, "the response rate (percent of people who complete the survey) usually decreases" (Burchell & Marsh, 1992, p. 4). If we increase the amount of questions asked, we can increase the amount of information gained, but this in turn discourages respondents to complete the survey due to time constraints. In order to support our conventional language style, we had our questions reviewed by survey experts and potential respondents (Fink, 1995).

3.3.2 Survey Review

We had two professionals review our survey. One professional is a college accounting professor, and the other a librarian who is very familiar with questionnaires and assessments. They both gave us valuable feedback about not only the content but the structure of the survey. Having their feedback helped ensure that our survey was ready to distribute to companies. It is important to have not only survey professionals but, potential respondents test the survey. These potential respondents were able to give more comments regarding coherency and if the survey could cater to a large audience of individuals. We had some of our classmates, a tax accountant, and a software engineer take the survey and notify us if anything was confusing or hard to understand. After finalizing the survey, we had to complete the standard forms to obtain approval from WPI to distribute the survey.

Before we can administer our survey, there is a form we must complete so that WPI recognizes our survey administration and approves that the rights of the respondents are

protected (refer to Appendix B). The WPI Institutional Review Board (IRB) is meant to help researchers understand and comply with the ethical guidelines and regulatory requirements for research involving human subjects (IRB Website). However, certain categories are exempt from review by federal regulation, as was the case with our survey. Because our survey contained minimal or no risk to the people who were taking it, we were approved by the IRB and were able to administer our survey.

3.3.3 Survey Administration

When administering our survey, our options included mail surveys, group administered surveys, and oral surveys among others. We decided to utilize an internet based (or "electronic") survey. The internet provides a venue for respondents to work right at their desktop where ever they are in the world. An internet-based survey also helps remove bias since the respondent and researcher do not have direct contact. Electronic surveys also have higher response rates than mail surveys or interviews (Colorado State University, 2008).

In order to complete our research it was crucial that we utilized a survey instrument with the following particular features: skip logic, unlimited responses, and various question styles. The skip logic allows respondents to skip over questions not relevant to them. Unlimited response will give us flexibility in the amount of survey respondents that may participate. Also, we included likert scale and multiple choice questions in our survey, along with some other types of questions. We looked for survey engines and found two that provided all these features and compared their prices (Survey Monkey and Question Pro). Our advisor suggested software called Qualtrics (refer to Appendix D for the Budget Information Survey). Not only did it provide everything we were looking for, but it was free of cost. So, we chose to administer our survey through Qualtrics because not only is it convenient for the individuals taking the survey, but also for the researchers analyzing data. Qualtrics produces excel spreadsheets that contain responses to each question individualized to each survey, which makes for easy conversion into excel reports. We used Analysis ToolPak, an Excel add-in, to produce histograms, ANOVA tables and other statistical displays.

We had multiple options in choosing how to distribute the survey to professionals. Some of which are as follows: distribute the survey to local businesses, send the survey to random

companies nationally, and contact Alumni and ask them to pass the survey throughout their current employers. We decided to choose WPI's Career Development Center (CDC) to distribute our survey because they had contacts that were personally invested in WPI, and thus were more likely to complete the survey. They were able to give our survey to a variety of companies that recruit WPI students to work for them (refer to Appendix C for our survey request email). Due to the CDC's large involvement with professionals they were able to send our survey to 460 companies. Because the CDC has to maintain a certain level of confidentiality, we were not able to obtain any contact information from our respondents. This restricted us from being able to conduct any follow ups.

3.4 Interview

3.4.1 Interview Design

A research interview is an interview that can provide reliable evidence to answer a research question (IGSD). We used the interview to gain pertinent information on how the budget is shared within a company, or if not, why not and/or what information is shared. Interviews are particularly useful for getting the story behind a participant's experiences (McNamara, 2008). In addition to the survey, which is intended to give us direct answers as it is more close-ended, conducting an interview will allow us to compare responses of open-ended questions. This allows the participant to describe what is meaningful or important using their own words rather than being restricted to predetermined categories; thus participants may feel more relaxed and candid (Kvale, 1996). There will be room for interpretation during each question which will allow the interviewee to go into detail with each answer. The interview will offer qualitative information that we can use to review, for example, the different feelings and attitudes one has toward the presence or absence of some type of computerized information sharing system. Also, it is most useful for exploring individual differences between participants' experiences and outcomes. We have the ability to observe our interviewees' reaction and body language to each question, and interpret what may be the real meaning behind their response.

Interview questions should be well developed, and contain some or all of the following topics: behaviors, options/values, feelings, knowledge, and background/ demographics (McNamara, 2008). Including a variety of these topics in our interview will allow the managers to effectively analyze their information sharing process, by including actions, opinions, feelings,

facts, senses, and history that deal with what they actually do. In addition to the topic of the questions, the sequence and wording of the questions is important. Getting the interviewee involved immediately is a good way to start, followed by a steady dose of factual questions about the present before any controversial questions, and ending with any future endeavors. Giving the interviewee a chance to add what he/she feels we might want to know is a good way to end the interview (McNamara, 2008). With what we have learned about interviewing, we have come up with a detailed yet efficient interview that is at some times short and to the point, and at other times leaves room for us and/or the interviewee to expand on an issue or question. Each question has a purpose and was placed in an order so that the interview can move smoothly and without confusion. Specific questions directed toward each different type of company allowed us to show differences in the sharing of budgets by each company. Also, there must be some control, or demographic questions, that every firm answers allowing us to compare their answers to other questions relative to the control questions. Asking the right questions leads to a successful interview, which allows us to gain the information we are looking for. Once the interview questions were finalized the next step involved finding the right professionals to provide us with answers.

3.4.2 Interview Administration

Conducting an interview with upper management personnel is a very good way to begin to develop an understanding of how information (specifically budgets) is shared within the company. This is because these individuals have a bird's eye view of their company and how the budgets are shared. However, because most of the information we are looking for should be known by middle management (or they should have access to this information), managers/assistant managers were able to help us address and answer our research questions as it pertained to each specific company.

In his paper, McNamara (2008) tells of the "art" of conducting an interview, saying that clearly identifying what problem or need that is to be addressed by the interview is the first step. Choosing a setting that is comfortable for the interviewee is critical, along with being able to stay focused to his/her answers and making sure they know the purpose and nature of the interview. Confidentiality is also key to emphasize that all responses will be kept confidential and neither their company's name nor theirs will be published in any of the reports. This will allow the

interview to run more smoothly, and may increase the amount of information the interviewee is willing to share. Having at least two people present at the interview is ideal, one focusing on the interviewee while the other takes notes. An alternative tool (if allowed) is a tape recorder, which ensures the interviewer is freeing up as much attention as possible in order to stay focused on the questions and the interviewee's responses. It is also very important to remember to ask the interviewees if they have any questions, and let them know how to contact the interviewer. This allows the interviewees to clarify and/or elaborate on any of their responses as well as inquire about the results.

We selected four companies with different sizes and responsibilities. We chose local businesses due to the close proximity and likelihood to assist students at WPI. We decided on a medium sized insurance company, a food service franchise, a medium-sized innovative firm and a small non-profit organization (see Appendix E). Depending on each companies use of an MCS we can analyze how different types of firms interact with budgets and technology (see Appendices H and K). For the food service franchise, we decided to create a separate interview from the others because the organizational structure differed significantly (refer to Appendix F).

3.5 Data Analysis

3.5.1 Quantitative Data Analysis

Now that we have administered our survey and conducted our interviews, the next step is analyzing our data. There are many methods we can utilize in order to fully comprehend and understand our results. Quantitative data analysis is the process in which numbers are analyzed to interpret data (Cook, 1996). There are a variety ways to analyze data using statistical methods. The techniques we are going to focus on are:

- Descriptive Statistics
- Correlation
- T-tests
- ANOVA
- Regression

- Pivot and other data tables

3.5.1.1 Descriptive Statistics

The descriptive statistics allow for researchers to know what their data generally looks like (Correa-Prisant, 2009). The first step involved in descriptive statistics is to detect and correct (or remove) inaccurate or corrupt data from our data set. We must check for out of range values, missing values, and frequencies of the values. This is a very important step, as one outlier may affect the researchers overall results, and may have some influence on your recommendation or insight. We must also make sure that all variables involved in the analysis had received a response. One of our demographic questions asks if the person receives or has access to company budgets. If they say no, then they are directed to the paper consumption question. Their data is only applicable to security, paper conservation, and paper consumption questions. After we screen those who didn't finish, we can find the mean (along with standard deviation), median, mode, and range of our data. Descriptives can be seen in Appendix L. The following sections will discuss inferential statistics, which will help us to draw conclusions and make suggestions.

3.5.1.2 Correlation

Correlation is a statistical technique that can show whether variables are related and the significance of the relation (Rees, 1995). The main result of a correlation is called the correlation coefficient (r). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related, and if r = 1 or -1, then we say that there is perfect correlation. If r is equal to 0 there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative, it means that as one gets larger, the other gets smaller. In addition to evaluating the relationship between the variables the relationship has to be tested for its significance. By comparing the r and the $r_{critical}$ value, it can be determined whether or not the correlation is statistically significant (if $r > r_{critical}$ or $r < - r_{critical}$ then there is a statistical significance – see Appendix N). The square of the coefficient (coefficient of determination or r^2) allows observers to see how effective one variable is at forecasting another variable. The higher r^2 the more effective one variable is at forecasting another. The lower the $r^2$is then the higher the likelihood that one variable has little in common

with the other. The r^2 coefficient shows what percentage of the variability of the data can be predicted by the variation of the other variable.

This can be applied to our data by analyzing how the satisfaction with the current budgeting system affects respondent's confidence that their company's financial information is secure. After these data are plotted against each other and we calculate the correlation and the r^2 we will be able to determine if the satisfaction of the budgeting system could explain the respondents confidence that their company's financial information is secure based on how close to one the r^2 value is (Trochim, 2008).

3.5.1.3 T-Tests

T-tests are used to test whether the means of two groups are statistically different from each other (Irwin, 1999). In order to compare the data we collected from different companies grouped according to industry, we will use independent sample t-tests. These t-tests can be conducted with a variety of different statistical software. There are several assumptions in T-tests:

- The samples are random samples of their populations.
- The data come from normally distributed populations.
- The two samples come from populations with equal variances.

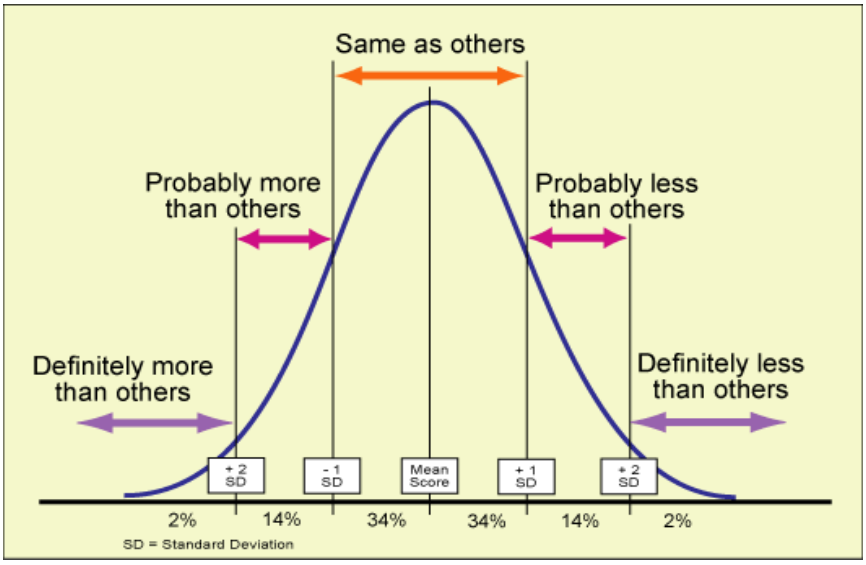


Figure 1 Standard normal distribution

("Media Assemblages," 2009)

With regards to the assumption of a normal distribution (see figure 1), the central limit theorem states that if a sample size is greater or equal than 30 ($n \geq 30$) then it is safe to assume normal distribution (Park, 2008). Therefore, as our sample size is 54 ($n=54$), then we can assume normal distribution. Refer to Appendix L for representation of the data we collected.

Before we are able to start analyzing the data, we need to determine if we want to do a one-tailed test or two-tailed test. A two-tailed test looks for any change in the parameter, where as a one-tailed hypothesis allots the entire alpha to testing the statistical significance in the one direction of interest. Alpha is the probability of making a type I error, which is rejecting the null hypothesis when the null hypothesis is true. It is ideal to keep alpha small (i.e., 0.05 or 0.01).. Both of these tests will be useful in analyzing our data. The confidence levels set upper and lower bounds on an estimate for a given level of significance. The .05 significance level, for example, gives us a 95% confidence interval. T-tests provide an output, or P-value, that corresponds to the probability that the two data sets are not significantly different. This value represents the actual area under the standard normal distribution curve (the probability of a particular sample statistic or a more extreme sample statistic occurring if the null hypothesis is true). If the P-value $\leq .05$ we reject the null hypothesis, and if P-value $> .05$ we do not reject the null hypothesis.

An example of T-Tests being utilized in our research is analyzing the following two survey questions: 1) How long have you been with the company? 2) Do you have access to company budgets? We can declare access to company budgets does not have a relationship with how long an employee has been with the company as our null hypothesis. The alternate hypothesis is if access to company budgets has a relationship with how long an employee has been with the company. With the hypothesis statements complete the next step is to find the difference of the means through T-Tests. Once we determine the p-value we will be able to conclude the probability that the budget access is significantly different between employees who have been employed for a short time vs. long time.

3.5.1.4 ANOVA

In general, the purpose of analysis of variance (ANOVA) is to test for significant differences between means (Statsoft 2008). By finding statistical significance, we are

partitioning the total variance into what is just due to true random error, and what is due to differences between means. If we are only comparing two means, then ANOVA will give the same results as the t-test for independent samples. Thus, the ANOVA provides "a much more flexible and powerful technique that can be applied to more complex research issues" (Statsoft, 2008). Instead of computing multiple, two-group studies and analyzing the data via t-tests, we can (with fewer observations) gain more information using ANOVA methods. For example, we could use an ANOVA to test whether employee position has an impact on their involvement with the budget. We would use the following question as our independent variable: How would you best describe your position? The dependent variable would be: Do you have access to company budgets? We would look at the means of the dependent variable answers grouped by the answer that they gave for their position. If the p-value is less than alpha than we can conclude that the means are significantly different. We can suggest that position does matter when trying to determine the involvement with the budget.

One-Way ANOVA Table

Source	**D.F.**	**S.S.**	**M.S.**	**F**	**P**
Factor	t - 1	SS(Between)	MSB = SS(Between) / (t - 1)	MSB/MSE	p-value
Error	N - t	SS(Error)	MSE = SS(Error) / (N - t)		
Total	N - 1	SS(Total)			

3.5.1.5 Regression

Regression analysis is a statistical tool for the investigation of relationships between variables (Sykes, 1998). Unlike ANOVA, regression will show us how well related two numerical (and only numerical) variables are. Regression does not involve categorical variables. Linear regression will allow us to analyze the effects a causal variable has on the variable that it influences, and then assess the statistical significance of that effect. It answers the question: Are the differences due to more than just random error? We can run either simple regression (which

is regression with a single explanatory variable) or multiple regressions (LinRegApplet, 2008). The regression equation takes the form:

$$Y = b_1*x_1 + b_2*x_2 + c + e$$

where Y is the true dependent variable, the bs are the regression coefficients (slope) for the corresponding x (independent) terms, where c is the constant or intercept, and e is the error term reflected in the residuals (Garson, 2008). An example from our data where we could apply regression is analyzing how the presence of a paper conservation policy in a company can affect how many times the various budgets are printed per year. To run a regression on this variable we needed to convert the responses from the likert scale into numerical responses. After running a regression on certain variables, the F-test can be used to test the significance of R, which is the same as testing the significance of the regression model as a whole.

3.5.1.6 Pivot and other data tables

Tables, lists, and graphs are also used to report our data. When analyzing data, if the number of categories is small we can report using text. But when the number of categories gets too large, it is more convenient to report in tables. More specifically, pivot tables allow you to quickly find relationships by allowing you to move data around. One of the main advantages of using pivot tables are they allow you to drag and drop columns to different rows, columns, or summary positions (Peltier, 2007). Pivot tables allow researchers to identify trends in data and allow for quick manipulation of data. Pivot tables can be created using Excel. Lists are also useful to order a set of ranked variables by their average rank, and are easy to read. When creating graphs, we must remind ourselves that we are not the only ones who are reading them, and that we must be as neat and clear as possible to avoid any confusion for future analyzers.

3.5.2 Qualitative Data Analysis

Qualitative Data Analysis is the range of processes and procedures whereby we move from the qualitative data that has been collected into some form of explanation, understanding or interpretation of the people and situations we are investigating (Gibbs, 2002). We will be analyzing the qualitative data from our interviews. The first step in analyzing our data is transcribing this information (Refer to Appendices G, I, J, and K). This allows us to carefully read the transcribed data into meaningful analytical units. Once the interviews are transcribed,

we have to take our information gathered from the interviews and write down any impressions we have. As we gather impressions it is important to remove any unnecessary information that does not add meaning or value.

To help draw conclusions about what goes into the decision making process of integrating a MCS, and the experiences of using one, we would like to find out what themes were discussed the most throughout the interviews. Content Analysis can be used to describe themes in discourse. We will analyze our interviews and surveys to see which themes the respondents discussed with relation to integration of a MCS. Content analysis also can be used to determine "propaganda" (Weber, 1990). An example of this is that some of the business owners may have felt the need to say that they care about conserving paper to make their company seem environmentally aware. It is important that we take the context in which the respondent spoke as a factor. This is a form of Hermeneutical analysis. Hermeneutical Analysis can be defined as "making sense of written text" (Ratcliff, 1990) and allows one to understand that some data is not the same when objectively taken out of context.

Quasi-statistics is a method of transforming qualitative information into quantitative data. We count the number of times that a particular theme is mentioned and we display it as quantitative data (Ratcliff, 1990). This is useful for our research because we are trying to find which reasons are factored into deciding whether or not to use a MCS. It also helps in the linking of our qualitative and quantitative data.

3.5.3 Inter-Rater Reliability

For our qualitative data in our interviews, we will analyze the responses to determine what we think this particular answer means. This can include the content analysis where we look for themes. There needs to be a way to determine that all three of the researchers interpret the same theme from that answer. This allows for us to have more valid suggestions due to more valid data. Also, we will look at a particular response to determine the intensity of the person's answer. This is called rating because we are ranking the qualitative data and putting a number on it. There needs to be a process to determine that we all agree that the answer has a particular level of intensity. This process of validation is commonly referred to as inter-rater reliability. We will be using the triangulation method that Armstrong et al discuss. We will look at the data separately and make our own ratings privately and then compare afterwards to determine any

disparities and determine what the difference in interpretation is due to (Armstrong 1997). In Olesen et al's (1994) research the researchers actually sat in a meeting and discussed the content. We did this after we rated the responses on our own.

3.5.4 Linking Quantitative and Qualitative Data

It is important for our research to link qualitative and quantitative data so we are able to elaborate and develop analysis, providing richer detail. This helps to expand the breadth of a study by combining different methods in different components. According to Firestone (1987) quantitative studies "persuade" the reader through de-emphasizing individual judgment and stressing the use of established procedures, leading to more precise and general results. On the other hand, qualitative research persuades through rich depiction the strategic comparison across cases, thereby overcoming the "abstraction inherent in quantitative studies".

4.0 Quantitative Results Chapter

With regards to analyzing our data results, we will begin with a review of some of the descriptive statistics of all the respondents (Refer to Appendix L). For the question, "How long have you been with the company," we find a mean employee tenure of 5.831 years, which is placed in the middle category of 3-10 years. We find a mean involvement rating of 3.513 with the firm-wide operating budget. This means that the mean answer to this question was somewhere between neutral and agree that the respondent is closely involved with preparing or implementing the firm-wide operating budget. For the department operating budget, a mean involvement of 2.1 indicates that the mean answer to the respondent being "I am closely involved with the department operating budget" was disagree. With a mean involvement of 3.44, we find that the mean answer to "I am closely involved with the capital budget" is between neutral and agree. For the question that addresses feasibility of a computerized budgeting system, a mean answer of 2.888 indicates that the mean answer is between unfeasible and neutral. The mode is 2, meaning that the most frequent answer was unfeasible. With a mean answer of 2.58, we find that people are between dissatisfied and neutral about their current budgeting system. The average length of the budget has a mean of 20.153 pages, with the most frequent answer being that the respondent's budget is between 1 and 10 pages. For "how many times do you print the various budgets per year," we find a mean of 5.81 times, however, the

most frequent answer is 0-2 times. A mode of 17.5 pages and a mean of 17.98 pages, indicates that printing around 17 pages per day is usual. For the statement, "my company actively promotes saving paper," we find a mean agree rating of 2.62, which shows that the average answer is that respondents disagree that their company promotes saving paper. With a mean answer of 2.1 (disagree) and a mode of 2, we find that the average answer to someone being confident in their company's financial information is that they are not confident. For the last question, we find that the mean number of security measures a company has is 3.4545 and a mode of 4, meaning that almost all of the companies have all of the security measures we listed.

After looking at the descriptive statistics, we must look over the data and eliminate any outliers. Fortunately for us, there was only one outlier. For some reason, when one of the respondents took the survey, they answered all the questions except for the last couple. We should delete their answers from our data set, in order to allow for constant sample size for all related questions. For example, if they answered the industry question but didn't answer the security question, then we would have one more answer in the industry data set than the security data set, sample sizes would not be consistent, and our results could be corrupted. Now, we can group our respondents' answers in order to answer our research questions. Results from the statistical analyses are included in Appendix M.

In order to address our first research question, we predicted that there was a relationship between mean number of pages printed per day and whether or not a computerized budgeting system was present. Even though there is a difference in the average number of pages printed when a company has a computerized system (mean 17.6 pages) and when it does not (mean 10 pages), information from a two-tailed t-test (t-value being 1.3306 and t Critical being 1.70814 with a p-value = 0.1953) shows that the difference is not significant enough to support our hypothesis. We can conclude that there is no significant difference in the quantity of pages printed whether or not they have a computerized budgeting system.

Pertaining to our second research question, we predicted that there was a relationship between the length of the budget and amount of times employees print. We believed that the longer the budget is, the more likely the employee would be to print it. This is mainly because we feel that, among other factors, it may be uncomfortable and a strain on the eyes to sit for a long time (long budget) and view it on a computer screen. When initially comparing the means

(ANOVA, F-value = 2.135, F critical = 3.295, p-value = 0.1347), we found no significant difference. However, a one-tailed t-test (p-value = 0.0304) that compares how many times the budget is printed between the 10-50 (4.458 time) and 50+ pages (9.3 times) categories shows that the longer the budget is, the greater the number of times employees print it, thus providing support for our prediction

With regards to our next research question, we hypothesized that employee level, employee role, and length of employment affects the employee's access to the budget, involvement with the budget and satisfaction with the electronic budget information system. We thought that the higher up an individual is in a company the more involvement they have with budgets.

We start with budget access. Initially, with an ANOVA table (p-value = 0.169) we did not find evidence that access to the budget depends on their level. However, we can adapt our hypothesis to say; "we believe it is less likely for people who labeled their position as 'support staff' to have access to budgets than people who labeled their position as 'upper management." We can keep the same principle of our initial hypothesis, and see that a one-tailed t-test (p-value = 0.033) validates our prediction; support staff members are less likely to have access to company budgets than upper management personnel. Another ANOVA table (p-value = 0.034) suggests that the longer an employee had been with a company (10+ years in comparison to 3-10 years) the more likely they are to have access to company budgets.

Now that we have looked at budget accessibility, we can see how involvement is affected by length of employment. An ANOVA (p-value =0.004) showed that how long an employee had been with a company influenced involvement with the capital budget. Although this relationship is not in the same direction that we predicted, it was significant: Our data showed that the longer the employee had been with the company the less involved they were with the capital budget. The firm wide and department operating budgets differences in means were not significant enough to suggest a significant relationship between length of employment and involvement with the budget. When we conducted an ANOVA for the combined involvement of all three budgets, there was a significant relationship (p-value = 0.046) between the length of employment and involvement. Although this suggests that people who had less tenure were more involved with the three budgets, the p-value from the capital budget data was so small (0.004) that it may have

influenced the final results. Because of this, along with such a small sample size (9), we do not want to make a conclusion without further analysis.

Still on the topic of budget involvement, we look at how it is affected by employee roles. Our hypothesis states that people who are responsible for the monetary side of the company (revenue, expenses, investment) will have more involvement with the firm-wide and capital budgets than people who are in management, HR or recruiting. For respondents who answered that they were responsible for reducing expenses and managing investments, we found no significant difference in mean involvement with any of the three budgets from an ANOVA table. However, a p-value of 0.025 indicates that a person who selected "increasing revenues" as their role has statistical significantly more involvement with both the firm wide operating and capital budgets than the department operating budget. A p-value of 0.0323 indicates that a person who selected "human resources/recruiting" as their role has statistically significantly more involvement with both the firm wide operating and capital budgets than the department operating budget. A p-value of 0.036 indicates that a person who selected "management/other" as their role has statistical significantly more involvement with both the firm wide operating and capital budgets than the department operating budget. This does not fully support out hypothesis, and therefore we cannot say which budget is associated with what type of role.

Budget system satisfaction is our next topic, as we look at how it can be influenced by employee level and employee role. An ANOVA table (p-value = 0.044) illustrates a statistically significant difference in budget system satisfaction between the different job titles. Specifically, technicians were the most satisfied with their systems (mean satisfaction rating = 4 in comparison to the median of 3), and upper management personnel were the least satisfied (mean satisfaction rating of 1.667). Also, the middle management category had significantly more respondents working with the budgets either weekly, more often than weekly, or monthly than the technician category. This information suggests that budget system satisfaction will decline as you move up an organizational hierarchy. Two separate ANOVA tables were created differentiating between the three 'lower' job titles (Technician, Support Staff, Lower Management) (p-value = 0.0258) and the three 'higher' job titles (Executive, Upper Management, and Middle Management) (p-value = 0.81). Because of the statistical significance (in the 'lower' ANOVA table) we conclude that the lower the position, the higher the

satisfaction. This was particularly evident between technicians (satisfied) and lower management (dissatisfied). Interestingly enough, because of the *lack* of statistical significance (the 'higher job titles' ANOVA table), we cannot conclude that there is a significant difference in the mean satisfaction rating of 'dissatisfied' between the levels of middle management, upper management, and executive (means = 2.5, 2.64,3, respectively). Basically, they are all dissatisfied with the current budgeting system. After looking at employee job level, we can look at employee role. A two-factor ANOVA (p-value = 0.654) shows there is no statistically significant difference in budget system satisfaction between the different company roles. However, this tells us that since the mean satisfaction rating of all job titles is not significantly different from 2.64 (on a scale of 1 to 5), then we can conclude that no matter what a person is responsible for, they are generally dissatisfied with their current budgeting system.

An interesting point that must be made about the above research question data is the small sample size. During some statistical tests, the number of respondents was sometimes as little as 4, and we have to believe that results/significance might have been different had we had a larger sample size.

To address the next research question, we examine the impact that information system security has on employee satisfaction with their current budgeting system. Our hypothesis is that the more types of security a firm has for its financial information, the more satisfied the employees would be with their system. From an ANOVA table (p-value = 0.79) we see that the difference in mean satisfaction with the budgeting system is not statistically significant. The satisfaction was increasing as the number of security measures increased from 1-4. We can again state that people are dissatisfied with their budgeting system (mean satisfaction rating of 2.4) no matter how many security measures their company has in place to protect its financial information. We can now observe the relationship between budget system satisfaction and how confident one is that their company's financial information is secure. To measure the strength and direction of a linear relationship between the two variables, we measure the correlation between budget system satisfaction and confidence in financial information security. We find that the correlation coefficient (0.442) is not very strong to suggest a linear relationship, but it is significant. In order to test significance of a correlation coefficient, we must use a correlation significance table (Refer to Appendix N). From the table, we must use the degrees of freedom

(n-2 = 33) and our significance level (95%) to find the minimum coefficient amount in order for the relationship to be significant. The minimum coefficient for df = 30 is 0.349 and the minimum coefficient for df = 35 is 0.325, so we find that since our correlation coefficient is 0.442, it is significant. Because the direction of the relationship (positive) is significant, we can say that as budget system satisfaction increases, the confidence one has that their company's financial information is secure increases as well.

Regarding our next research question, we predict that if people state that their company has a paper conservation policy, then the number of times they print the various budgets will be lower than if they do not have one. Basically, we believe that a paper conservation policy will cause an individual to print less. We can run a regression with the independent variable being the likert scale rating of "My company promotes saving paper," and the dependent variable being the amount of times the respondent prints the various budgets each year. We find that this relationship is not very strong, as the R coefficient is 0.088 and the $R^2 = 0.0079$. Using a 95% confidence level, we find that the R coefficient is not significant, as the F value of 0.2632 is not greater than the significance F of 0.6113. Information from an ANOVA table (where we change the variable "My company promotes saving paper" to categorical) leads us to conclude that there is no evidence that the number of times the budget is printed varies based on the presence of a paper conservation policy (p-value = 0.27399, and the mean number of times printed from strongly disagree to strongly agree are respectively = 1.9, 2.538, 2.5, 2.4, 1). However from the table, we find that people who print the budget 0-2 times a year agree more that their company has a paper conservation policy than the people who print 2-5 times each year Based on a one-tailed t-test (p-value = 0.025); the people who print less have a higher "agree" rating to the paper conservation statement than the people who print more. An interesting point to make with this research question is that no variable yields a mean agreeability rating above 3 on a scale of 1-5; this draws us to conclude that on average people did not agree that their company had a paper conservation policy. As the number of times they print the budgets per year changes, the mean agreeability rating is always at neutral or below; on average, respondents do not believe their company promotes saving paper.

Because of the some of the demographic questions in our survey, and the data we reviewed when answering our research questions, we have developed some exploratory

questions to examine. The first exploratory question looked at the respondents' general confidence that their company's financial information is secure. We predicted that because of today's technological advancement, people would be confident about their company's security. However, by comparing the mean confidence of 2.111 (disagree) to the median confidence of 3 (neutral), we can conclude that our data suggests people are not confident that their company's financial information is secure.

The next exploratory question will show how the industry affects employees' perspective towards security and the company's attitude towards paper consumption in regards to financial information. We believed that industry would have a strong effect on both security and paper consumption, although we do not have an idea what that relationship will be. After running several statistical tests, we find no significant differences in confidence of security or number of security measures between any of the industries. Specifically, when we compare the different industries (ANOVA table), there is no significant difference in number of security measures (p-value = 0.3427) or confidence in financial information security (p-value = 0.6473), and there is no significant difference in number of security measures depending on the presence of a paper conservation policy (p-value = 0.1655). We did, however, find that a two-tailed t-test (p-value = 0.0499) shows a difference in number of security measures between the people who said they strongly disagree (that their company promotes saving paper) and who said they are neutral (in the area of their company promoting saving paper). People who answered strongly disagree had fewer security measures. Moving on from security, we examine the relationship between the industry and the number of times a person prints the various budgets each year as well as the company's conservation policy. An ANOVA table (p-value = 0.037) shows that there is a significant difference in the number of times someone prints based on the industry their company is in. Manufacturing companies print the budget the least (under 2 times per year on average), and companies that sell goods print the budget the most (almost 4 times a year on average). With regards to how a respondent believes in the presence of a paper conservation policy, an ANOVA table (p-value = 0.79) shows no significant difference depending on the industry. With a mean confidence agreeability rating (2.53- disagree), we also see that no matter what the industry the company is in, employees don't think their company promotes saving paper.

For t-test summary, regression output, correlation output, and ANOVA tables, please refer to Appendix M.

Overall, we feel that we have made some interesting discoveries with regards to how the budget is shared, who it is shared with, and the measure of paper usage, security, and employee satisfaction. It is surprising to see that a computerized budgeting system did not show to have significant impact on the amount of paper the respondent prints. Also, we were able to confirm our predictions that the longer a budget is, the more times it is printed, and that the higher the level at which an employee works, the less satisfied they are with the budget. We have examined how involvement and role can play a role in budget sharing and find that there is no statistically significant difference in how involved an individual is with the budget and their role in the company. Looking at how a company protects its financial information, we learned about the types of measures companies used, as well as how employees feel about thesecurity of their company's financial information. Different companies use different techniques to share and protect budgets and involve employees with them, and a MCS can help the company in all three areas.

5.0 Qualitative Results Chapter

Our qualitative data, obtained from our interviews, (see Appendices G, I, J, and K for transcribed interviews) suggests that all companies share budgeting data, but with limitations on who gets to view those data. In the manufacturing company (or MC Co.), the engineers who designed the products rarely saw the various budgets except for motivational purposes. In the food service franchise (or FSF Co.), the manager received a budget from the headquarters, but rarely shared it with any of the regular employees once again mainly for motivational purposes. The manager said that she would use the budget when she was training a staff member to move higher in the corporate ladder. The non-profit (or NP Co.) shared the budget with contributors, the board of directors, and others directly involved in finance. The insurance company (or IC Co.) also shares the budget with the operations department, management, and the board of directors.

Even with this limitation on who they share the budget, most companies still seem to print the budget often, although all the firms we interviewed but one promote saving paper.

Additionally they point to several limitations of their financial systems that contributed to the increase in printing. The non-profit said that sometimes the computer system is set up so strangely that the users need to print out a lot of paper just to read over one line in the budget. The food service company also blames computers for more printing, since they make printing it easier. The manufacturing company also noted that ease of use was a problem with their ERP, since ERPs were not designed for engineers. This had nothing to do with their paper usage though, since this was the only respondent to say that their company does not actively promote saving paper. MC Co. also provided shockingly large numbers for the amount of paper that the company used per month. An invoice from the printing department stated that they used more than 100,000 pages per month. This did not include personal printers in offices or most of the copiers used for Xeroxing. The insurance company says that it uses so much paper that they were not able to even give an estimate of how much paper they used.

The technology used to share financial information varied between the industries. The non-profit had 2 types of software to work with donations. They used proprietary software made for them to manage the money coming in, and other software to manage how the money was distributed to other nonprofit organizations. The non-profit also used a general ledger system to manage the accounting information. The manufacturing and insurance companies were required to implement ERP systems due to industry regulations, but both found the implementation cost of the ERP to not be worth the cost savings that an ERP provided. In fact, these two companies and the non-profit all saw implementation costs as a hindrance to implementing a management control system. The food service franchise uses an intranet to share its budget information, with no complaints on cost. Security was also an issue for the companies we interviewed with regards to implementing a MCS.

The food service company also seemed to have a secure set-up for their budget information software. The intranet was not accessible remotely, and the non-profit had this same security measure in addition to its many others; from firewalls to having an IT consultant come in on a monthly basis to diagnose security risks. All of four companies seem to mitigate security risk by limiting the amount of people that use the software.

MC Co., NP Co., IC Co., and FSF Co. all use computerized budget systems with varying degrees of satisfaction. The data suggests that they do not believe that using a MCS can be

associated with reduced paper usage. They also have varying ways of approaching securing the MCS, but all limit the access to the software as a security measure.

6.0 Conclusions and Recommendations Chapter

In conclusion, MCSs help facilitate information sharing within a firm. An open line of communication is necessary so that the sharing of budgets is effective. Sharing the budget in particular is important so that employees are able to evaluate their performance as well as be motivated for higher achievement. This IQP addressed the factors that affect a management control system's utilization. Overall, we found that paper use, security, and satisfaction were linked with the functionality of a MCS.

From our research our project group was able to determine that the presence of a computerized budget system did not cause employees to print more or less. We did find however, that the length of the budget affected printing. The longer the budget the greater the number of times an employee printed. Paper usage can also be affected by a firm's corporate culture. Companies that have a paper conservation policy tend to use less paper.

Our results supports that most employees are not only dissatisfied with their MCS, but they are also not confident in the security of the data. Employees with an upper managerial role are particularly less satisfied with their MCS. The number of security measures does not improve employee satisfaction with a MCS. However, when satisfaction with the MCS increases (from very dissatisfied to neutral), the confidence that an employee has in the security of their company's financial information increases as well (from very unconfident to neutral).

Companies have different policies about who is allowed to view the budget. Our research suggests that the longer an employee had been with a company the greater the likelihood they are to have access to the budget. It also showed that companies tend to limit access to the budget to only those who need to view it.

With regards to implementation of a MCS certain hindrances arise when considering how the MCS will affect the firm's profitability. These factors can prevent or prolong its integration. The data implies that cost is a prohibiting factor for many companies when deciding to implement a MCS. The length of training and setup time also had an impact on the firms'

transition from old systems to new systems. Although we obtained interesting results from our analysis, we had to overcome significant challenges to complete this project.

When we were first figuring out how we were going to distribute the survey to employees, we struggled with how we were going to get the survey out and get a good response rate. One of our first ideas to ensure a good response rate was to obtain a list of alumni from WPI's Career Development Center (CDC) and distribute our survey through e-mail to these contacts. Unfortunately as of right now there is not a contact list they are allowed to distribute to outside parties, but they were able to still assist us. Instead of distributing our survey to alumni, they distributed our survey to employers who are in contact with the CDC that employ WPI students. The CDC distributed our survey to multiple employers and asked them to pass the survey along to their employees. Due to the privacy of the CDC's mailing list we were not able to send follow up emails to remind potential respondents to take the survey.

Once the surveys were distributed, we had to wait for responses. Within two weeks we had over 80% of our total responses. The remaining 20% responded within the following two weeks. Overall out of the 460 surveys that were released, we received 71 responses (54 of which were useful). The interviews, however, had more delays in responses and some of our attempts were unsuccessful. The insurance company took a while to actually make an appointment for the interview. They agreed to participate in our research but due to family emergencies and inclement weather it took longer than we planned to schedule the actual interview. Also, the non-profit company took two contact attempts to secure an interview. The first time we contacted them was through email and we did not receive a response. We then found a contact on campus that had relations with the company and after a few weeks we got a response. We ended up waiting three weeks to get in contact with this non-profit organization. Another attempt that ended up being unsuccessful was contacting a WPI staff member who was largely involved with budgets. We contacted the individual through email and we never received a response.

The survey software we selected was obtained from Qualtrics.com. Overall creating the survey was not difficult and we ran into few problems. There were some minor issues in the types of questions the basic version allowed us to use. But there were so many different available formats of questions available in Qualtrics that we could accommodate for all of the

issues we encountered. One problem with this software was that we were not able to view any reports developed by Qualtrics, nor utilize the cross tabulation function. We were able to import the data to Excel and do any necessary analyzing from there.

There were many options for statistical software we could purchase or use for no cost. We ultimately decided to use Excel due to its ease of use and our familiarity with this application. There were add-ins available to do most of the functions we needed. However, we did have to use SPSS to conduct MANOVA tests since Excel did not have the tools to conduct this. Another challenge we ran into using Excel was that it was not able to run three-variable ANOVAs. We also encountered issues while trying to conduct regression and correlation. When sorting the data, we were not able to sort it automatically with Excel. We had to manually sort it before performing the necessary analysis.

Pivot tables were discussed in our methodology but when we actually started analyzing our data they were not used. We mainly used the descriptive data, T-tests, and ANOVA tests to analyze our data. We found enough relationships with these tools that it wasn't necessary to use pivot tables. However, pivot tables are very useful as a research tool and are very useful to know how to utilize. These challenges caused us to have to adapt, but also gave us some valuable learning outcomes and have suggested possible avenues for future research.

We recommend that future researchers look into other Management Control System technology, as we found more technologies than we originally thought and believe that there are still more out there to be found. We also think it will be valuable to find out if different industries share different information more often. This may involve doing more in depth study with three companies each from the different industries to see how they share information, quantify the amount of sharing that takes place with the budgets, and compare this between the industries.

We also would recommend that future researchers look into the effect of the size of the company on the way that the budget is shared. This would allow for more knowledge on how characteristics of the firms affect the way the budget is shared. Going even further into demographics, one may seek to look at how companies in different countries share their budgets. This may require a larger budget and a more diverse team to conduct interviews, but would

provide significant knowledge in the area of budget sharing. The researchers may be able to find a correlation between how often the budget is shared and the economic success of a country. On a microeconomic scale, more research should be done in the link between having a MCS and the amount of profits that a company generates. This could provide some best practices for struggling companies to use in order to run their companies to the best of their ability.

We also had limited time here at WPI, so we would even suggest that someone take this same method of study and extend it out into a longer term project where more interviews can be done with the same questions. Another survey should be sent out to follow up to our original one. This would give us a more substantial sample size and would allow for more support for the hypotheses and conclusions. Although we were not able investigate the topics discussed above, our accomplishments and learning outcomes are noteworthy.

Our IQP presented us with the challenge to address a problem that lies at the intersection of science or technology with society. It was also a learning experience and that helped us develop skills useful throughout the project. For the study of electronic budget information sharing, we had to research, interpret, and ask questions about general and specific procedures within a company. Some of the skills/lessons we learned from our study and project include areas of research procedures, citation/reference knowledge, time management, working in groups, data collection services, and statistical analysis.

Training in research procedures is valuable before one start doing the research. Specifically, the PQP is an excellent preparation technique. Looking back, we acknowledge the fact that the work may have been easier and we may have been able to start faster if we had enrolled in the PQP. From talking to people who have or are taking PQP, we find that some of the work we were doing our first term we could have done during PQP had it been available. Although this would have made the project easier, it did not negatively affect our finished product, and we were able to get through any challenges presented.

Having citations with research is very valuable in a background and literature review in order to show that we are not just making claims on our own. It is important to backup our research with quotations and other studies done on similar topics. Also, citations allow the

reader to develop a further understanding of what we are trying to say by giving them another form of the information.

Time management may have been the most important factor in completing our IQP. By managing our time wisely, we were able to create specific meeting times for working together and due dates for writing the report. After some immediate stumbles, our team developed good working chemistry and could get right into the project. Another time consideration involved having time away from IQP work. After spending so much time on a particular part of the project, it is hard to provide a real critical point of view. Having time away from the writing can help with the proofreading process. For example, in our background section, we were able to find errors and elaborate more on certain points when we reviewed it a few weeks before we turned in the project rather than a week after we finished writing it.

Another lesson we learned was that it is valuable to invest time in studying other IQPs. By looking at how other teams prepared and organized their reports, we were able to model our project around the good points of other projects. Other useful information taken from past projects included length and appendix organization.

This project calls for teamwork, and therefore being able to work well in a group was a big factor. Sometimes people may not get along and working in a group can be difficult. This project taught us that we must overcome any differences between ourselves to accomplish our final goal of successfully completing the project. Fortunately, for us, there were minor to no problems and working together was easy. We were each able to identify our respective strengths, whether it be researching, writing, communicating, or leadership, among others. By dividing up the work accordingly, we avoided any conflicts arising from someone doing less work than the others.

Another big skill that we all learned from this IQP dealt with the ways in which we collected data. Our IQP utilized a survey and several interviews, and we were able to pick up skills from each. When writing our survey, we learned how to organize the questions in a way to gain as much information as possible. We had to model it so that people are not hesitant to take/finish the survey because of time or length. With regard to the interviews, we picked up some skills in the area of communication and also how to present ourselves. It was important for

us to listen and interact with what the interviewee was saying so that we could make insightful comments.

Lastly, we learned important technological and statistical techniques. We had to use an electronic survey administrator to distribute our survey. We originally were deciding between various options, all providing the features we needed, but also all requiring us to ask WPI for funding to purchase the software. After further investigation, we found online software that had all of our required features and was free. When it came to analyzing our data, we had to brush up on known statistical techniques as well as learn some new ones. We were required to distinguish between what type of statistical test to use on a certain set of variables, for instance, a t-test or ANOVA. In addition to this, we had to interpret the data to find the real meanings, and then translate it into our results section.

On completion of this project, we have learned many things that can be useful in industry as well as personal endeavors and further research.

References

Armstrong, D., Gosling, A., Martaeu, T., & Weinman, J. (1997). The place of inter-rater reliability in qualitative research: An empirical study

Ashpole, D. (2004). Comparing these programs: Pros and cons. *National Public Accountant*, 28-29. http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=11941265&site=ehost-live

Barret, S. & Konsynski, B. (1992). Inter-organization Information Sharing Systems. *MIS Quarterly*, Vol. 6. http://www.jstor.org/stable/248993

Blaylock, J. (2004). No more metal file cabinets. *Accounting Technology*, 20, 16-16.

Booth, P., Matolcsy, Z., & Wieder, B. (2000). Integrated information systems (ERP systems) and accounting practice - the Australian experience.

Bryant, C. & Jary D. (1997). Anthony Giddens: Critical Assessments. London: Taylor & Francis

Burchell, B. & Marsh, C. (1992). Quality and Quantity. *Springer Netherlands*. Vol. 26, No. 3, August. www.springerlink.com/content/t9q7642w85r22m66/

Chudnow, C. (2001). High availability and document imaging. *Computer Technology Review*,

Chung, S., & Snyder, C. A. (2000). ERP adoption: A technological evolution approach. *International Journal of Agile Management Systems, 2*(1), 24.

Clarke, R. N. (1983). Collusion and the incentives for information sharing. *The Bell Journal of Economics, 14*(2), 383-394. Retrieved from http://www.jstor.org/stable/3003640

Constant, D., Kiesler, S., & Sproull, L. (1994). What's mine is ours, or is it? A study of attitudes about information sharing. *The Insititute of Management Sciences, Information Systems Research*, 400-421.

Cook, W. (1996). Data Envelopment Analysis in the Presence of Both Quantitative and Qualitative Factors . *The Journal of the Operational Research Society.*

Cooper, R., & Kaplan, R. S. (1998). The promise - and peril - of integrated cost systems. *harvard business review*., 76-109-19.

Dasgupta, S. (Ed.). (2001). *Managing internet and intranet technologies in organizations challenges and opportunities* . Hershey, PA: IGI Global. Retrieved from http://books.google.com/books?id=dct2pz-AABEC

Debreceny, R., & Gray, G. L. (2001). The production and use of semantically rich accounting reports on the internet: XML and XBRL. *International Journal of Accounting Information Systems, 2*(1), 47-74.

Doyle, J. (2006). Introduction to Interviewing Techniques. http://www.wpi.edu/Academics/GPP/Students/ch11.html

Dunlap, R & Mertig, A. (1992). American environmentalism: The US environmental movement, 1970-1990.

Edwards, J. R., & Newell, E. (1991). The development of industrial cost and management accounting before 1850: a survey of the evidence. *Business History*, 33, n1. p.35(23). Retrieved October 06, 2008, from Expanded Academic ASAP via Gale: http://find.galegroup.com/itx/start.do?prodId=EAIM

ERP payback. (2008). *Controller's Report*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=34409509&site=ehost-live

Esteves, J. & Pastor, J. (2001). Enterprise Resource Planning Research; An annotated bibliography. *Communications of the Association for Information Systems.*

Ferber, R., Sheatsley, P., Turner, A., & Waksberg, J. (1991). What is a survey? In Cryer & Miller (Ed.), *Statistics for business: data analysis and modeling* (PWS, Kent. ed., pp. 366-376)

Ferrante, C. J. (2006). Innovative sharing: Shared accounting information as a facilitator of trust and performance. *Journal of Engineering & Technology Management, 23*(1/2), 54-63. doi:10.1016/j.jengtecman.2006.02.005

Fink, A. (1995). How to ask survey questions. London: Sage Publications.

Firestone, W.A. (1987). Multisite qualitative policy research: Optimizing description and generalizability. *Educational Researcher,* 12 (2). 14-19.

Garbellotto, G. (2008). Small steps, giant leaps. *Strategic Finance, 90*(5), 59-60. Retrieved from: http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=35139280&site=ehost-live

Garson, G. David. (1998). Updated 2008. Multiple Regression. NC State – College of Humanities and Social Sciences. http://faculty.chass.ncsu.edu/garson/PA765/regress.htm

Gibbs, G.R. (2002). Qualitative Data Analysis: Explorations with NVivo. *Buckingham: Open University Press.*

Granlund, M. & Mourtsentan, J. (2003). Special section on management control and new information technologies. *European Acounting Review.* 2003.

Granlund, M. (2002). Moderate impact of ERPS on management accounting: A lag or permanent outcome? *Management Accounting Research, 13*(3), 299.

Gullkvist, B. (2002). Towards Paperless Accounting and Auditing. *From Idea to Knowledge.* BRC. 87-98.

Haas, A. (1995). DOS-based accounting software for small businesses. *The CPA Journal, 30*(6).

Hillary, R. (2000). *Small and medium-sized enterprises and the environment*. UK: Green Leaf Publishing.

Hornstein, A. (1999). *Growth accounting with technological revolutions.(statistical data included)* Retrieved from http://find.galegroup.com/itx/infomark.do?&contentSet=IAC-Documents&type=retrieve&tabID=T002&prodId=AONE&docId=A58499947&source=gale&srcprod=AONE&userGroupName=fl_gscholar&version=1.0

Hoskin, K. W., & Macve, R. H. (2000). Knowing More as Knowing Less? Alternative Histories of Cost and Management Accounting in the US and the U.K. *The Accounting Historians Journal*, 27(1), 99.

http://www.statsoft.com/textbook/stanman.html#basic

Hyvnen, T. (2003). MANAGEMENT ACCOUNTING AND INFORMATION SYSTEMS: ERP VERSUS BOB. *The European Accounting Review*, *12*(1), 155.

In business. (2008). *Financial Management (14719185)*, , 1-1. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=34653169&site=ehost-live

Janczewski, Lech. (1943). Internet and intranet security management risks and solutions

Jasch, C. (2003). The use of environmental management accounting (EMA) for identifying environmental costs. *Journal of Cleaner Production*, *11*(6), 667.

Johnson, H. T., & Kaplan, R. S. (1987). *The rise and fall of management accounting*

Keenan, M. (2008). Takes more than just technology. SourceMedia, Inc. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=34244259&site=ehost-live

Khosrowpour, M., (1951). Success and pitfalls of information technology management / mehdi khosrowpour. primary material: Book subject(s): Information technology--management.

Kloot, L. (1997). Organizational learning and management control systems: responding to environmental change. *Management Accounting Research*.

Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage Publications.

Lebas, M. J. (1995). Performance measurement and performance management. *International Journal of Production Economics*, 41(1-3), 23-35.

Levin, Irwin P. (1999). *Relating statistics and experimental design*. Thousand Oaks, CA: Sage Publications.

Li, X., Valacich, J. & Hess, T. (2004). Predicting user trust in information systems a comparison of competing trust models. *IEEE Computer Society*

Likert Scale. (2008). In *Encyclopedia Britannica*. Retrieved November 11, 2008, from Encyclopedia Britannica http://www.britannica.com/EBchecked/topic/1085454/Likert-Scale

LinRegApplet. (2008). Linear Regression Applet for California State University, San Bernardino. http://www.math.csusb.edu/faculty/stanton/m262/regress/regress.html

Lowth, G. (2008). CIMA is working hard to ensure that its members can guide their organisations through the crisis. *Financial Management.*

Lyons, D. (1995). HKM uses EDI to ease bank reconciliation hassles. *Management Accounting Research*.

Mandal, P. & Gunasekaran, A. (2003). Issues in implementing ERP: A case study. *European Journal of Operational Research*, *146*(2), 274.

Marcus, A.& Maletic, J. (2000). Data Cleansing: Beyond Integrity Analysis.

Masse, Delphine. (2006). T-Tests. Wake Forest University. http://www.wfu.edu/~massd2/T_test.htm.

Massie, R. (2007). Beyond document management. *Accounting Today, 22*, SR-19.

Massie, R. (2006). Reaping the benefits of paperless. *Accounting Today, 20*(16), 15.

Maurer, R. (1996), "Using resistance to build support for change". *Journal for Quality & Participation.*

McNamara, C. 2008. General Guidelines for Conducting Interviews

Media assemblages. Retrieved 3/4/2009, 2009, from http://mediaecologiesresonate.wordpress.com/

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis, 2nd ed. Newbury Park, Cal.: Sage.

Minnesota Department of Labor and Industry. (2005). *State of minnesota department of labor and industry workers' compensation division electronic data interchange implementation guide* . Retrieved from http://www.doli.state.mn.us/edi.html

Moustakas, C. (1994). Phenomenological research methods. Newbury Park, Cal.: Sage.

Murphy, K. E., & Simon, S. J. (2002). Intangible benefits valuation in ERP projects. *Information Systems Journal, 12*(4), 301.

Mykytyn, P. & Riemenschneider, C. (2000). What small business executives have learned about managing information technology. *Information & Management, 37*(5), 257-269.

Naumann, J. (2004). Tap into XBRL's power the easy way: The microsoft office tool for XBRL benefits all financial reporting participants. *Journal of Accountancy, 197*(5), 32. Retrieved fromhttp://fel.lm.worldcat.org/?genre=article&volume=197&issue=5&spage=32&issn=0021448&date=2004&aulast=Naumann&auinit=JW&title=Journal+of+Accountancy&atitle=Tap+into+XBRL%27s+Power+the+Easy+Way%3A+The+Microsoft+Office+Tool+for+XBRL+Benefits+All+Financial+Reporting+Participants.

Olesen, V., N. Droes, D. Hatton, N. Chico and L. (1994). Analyzing Together: Recollections of a Team Approach. *EBSCO Host.*

Oppliger, R. (2002). Internet and intranet security.

Park, H. M. (2008). Comparing Group Means: T-tests and One-way ANOVA Using Stata, SAS, and SPSS. http://74.125.47.132/search?q=cache:Vbi-gKDAokMJ:www.indiana.edu/~statmath/stat/all/ttest/ttest.pdf+t-tests&hl=en&ct=clnk&cd=7&gl=us

Parker, R. J., & Kyj, L. (2006). Vertical information sharing in the budgeting process. *Accounting, Organizations and Society, 31*(1), 27-45. doi:DOI: 10.1016/j.aos.2004.07.005

Peltier, J. (2007). http://pubs.logicalexpressions.com/Pub0009/LPMArticle.asp?ID=553

Pinsker, R. (2003). XBRL awareness in auditing: A sleeping giant? *Managerial Auditing Journal, 18/9*, 732-736.

Rasinski, K., Rips, L. & Tourangeau, R,. (2000). The psychology of survey response. Cambridge University Press.

Ratcliff, D. (2002). 15 Methods of Data Analysis in Qualitative Research http://qualitativeresearch.ratcliffs.net/15methods.pdf

Rees, D.G. (1995). Essential Statistics, 3rd ed. Chapman & Hall, London.

Roberts, R. S. (1979). Review: [untitled]. *The Accounting Review, 54*(1), 247-248. Retrieved from http://www.jstor.org/stable/246263

Robey, D. (1999). Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications. *Information Systems Research, 10*, 167.

Roslender, R. (1996). RELEVANCE LOST AND FOUND: CRITICAL PERSPECTIVES ON THE PROMISE OF MANAGEMENT ACCOUNTING. *Critical Perspectives on Accounting, 7*(5), 533-561.

Scapens, R., & Jazayeri, M. (2003). ERP systems and management accounting change: Opportunities or impacts? A research note. *The European Accounting Review, 12*(1), 201.

Schwartz, R. J. Toward a "paperless" computer center. primary material: Book subject(s): Computer output microfilm devices. information display systems. computer input-output equipment.

Scott, J. E. (1998). Organizational knowledge and the intranet. *Decision Support Systems, 23*(1), 3-17. Retrieved from http://www.sciencedirect.com/science/article/B6V8S-3TNBNP1-2/2/618f317dcb32ba450d09c48fbb334ed9

Sherbon, Greg. (2004). Document Management in the Digital Age: Why Do We Still Use Paper? *Decision Line.*

Silveira, S. J. (2000). American environmental movement: Surviving through diversity, the. *Boston College Environmental Affairs Law Review, 28*, 497.

Simmons, R. (1995). Levers of control: how managers use innovative control systems to drive strategic revewal. Boston, MA: 1995 Harvard Business School Press.

Sohal, A. & Waddell, D. (1998). Resistance: a constructive tool for change management. *Management Decision.* http://www.emeraldinsight.com/Insight/ViewContentServlet?Filename=/published/emeraldfulltextarticle/pdf/0010360807.pdf

Spathis , C., & Constantinides , S. (2003). The usefulness of ERP systems for effective management. *Industrial Management & Data Systems, 103*(9), 677.

StatPac. (2007). Statistical significance. http://www.statpac.com/surveys/statistical-significance.htm

StatSoft. (1984). Electronic Textbook. Updated 2008.

Strengths and weaknesses of mail surveys. (2008). Retrieved 11/12/2008, 2008, from http://writing.colostate.edu/guides/research/survey/com3a2.cfm

Sumner, M. (1999). Critical success factors in enterprise wide information management systems projects. *ACM*.

Sykes, A. (1998). An Introduction to Regression Analysis. *The Inaugural Case Lecture.*

Thomas, J. (2007). Small manufacturer finds QuickBooks enterprise solutions a better fit than ERP. *Manufacturing Business Technology, 25*(9), 28-28. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=26702533&site=ehost-live

Trochim, W.M. (2008). *Correlation*. Research Methods Knowledge Base. http://www.socialresearchmethods.net/kb/statcorr.php

Vahtera, P. & Salmi, H. (1994). EDI and Accounting. *Computer Audit Update.*

Weber, R. (2003). XML, XBRL, and the future of business and business reporting. In S. J. Roohani (Ed.), *Trust and data assurances in capital markets: The role of technology solutions* (pp. 3-6). Smithfield, R.I.: PriceWaterHouse Coopers.

Weber, R.P. (1990). *Basic content analysis*. Newbury Park, Cal.: Sage.

webmaster@wpi.edu.(2007). *WPI institutional review board.* Retrieved December, 15, 2008, from http://www.wpi.edu/Admin/Research/IRB/

York, R. (2006). Ecological Paradoxes: William Stanley Jevons and the Paperless Office.

Yusoff, A. M., & Sidhu, M. S. (2001). Paperless in the electronic era: Millennium dream and reality.

Zhu, K. (2002). Information transparency in electronic marketplaces: Why data transparency may hinder the adoption of B2B exchanges. *Electronic Markets*, *12*(2), 92-99.

Appendices

Appendix A – Problem Statement

In a company, information such as the budget, revenue statements, and variances are often shared with department managers, who then share with employees. This is done in order to keep everybody up to date on how the company is doing and in what direction they are going. In a perfect world, all of these financial documents would be flawless; all companies would be equally competitive and information within the company could be easily shared without security issues. Currently, none of these proposals are available, mainly because everybody is looking to better themselves and make more money for their company. Competition between firms can sometimes be fierce, and the security of each firm's inside information is viewed as one of the top issues they face. As for the environment, electronic information sharing is more economical than paper usage, but it may not be as secure. It's possible for hackers to attain this kind of data, but not when the paper the data was on is shredded after each use. Also, maintaining the data quality is important for future recommendations and changes for the company. All these factors coincide with the main idea that the information shared within a firm must not only improve the firm's processes, but also protect its individuality. If we cannot progress in our attempt to maintain the uniqueness of each firm, competition will become irrelevant as new ways of stealing information come about and every firm can duplicate the actions or ideas of the firms who come up with them first. We will search specifically for articles addressing the facts of managerial accounting as well as the technological aspect, as we hope to research how the integration of different data sharing technnologies can help a firm, and also protect it. Through the library database, articles and newspapers, surveys, and personal interviews, we will learn how this area has changed and what is being done in order to keep up with today's technology, as well as improve the situation as a whole.

Appendix B – IRB Application and Approval

to IRB 4/17/08

WORCESTER POLYTECHNIC INSTITUTE
Institutional Review Board
Application for Exemption from IRB Review for
Survey or Interview Research Involving Minimal or No Risk

WPI IRB use only
IRB #
Date:

Use of this application is recommended for most student project research involving minimal risk. Proposed research meets the definition of "minimal risk" when the risks to research subjects are not greater than those ordinarily encountered in daily life. This application is specifically intended for projects in which students are expected to conduct interviews, surveys or focus groups. If student projects are sponsored by US federal agencies, students and advisors should contact the IRB for assistance in filing a full application with the New England IRB.

Project Faculty Advisor(s):

Name: Fabienne Miller Tel No: 508-831-6128 E-Mail Address: fabienne@wpi.edu

Department: Management

Name: Tel No: E-Mail Address:

Department:

Student Investigator(s):

Name: Nicholas Comeau Tel No: 774 276 1568 E-Mail Address: ncomeau@wpi.edu

Name: Cordell Rogers Tel No: 845 399 5541 E-Mail Address: crogers@wpi.edu

Name: Serena Dubois Tel No: 207 299 3613 E-Mail Address: srdubs@wpi.edu

Name: Tel No: E-Mail Address:

Project Title: Innovation and Accounting (FM1ACC8)

Project Location and Time Frame: WPI, A08, B08, C09

Expected Research Subjects: (e.g. museum visitors under the age of 12)

Adults who work with budget information

NOTE: This application must be accompanied by written research methods and a reasonably complete set of survey or interview questions.

1. Is the proposed research sponsored or supported by a US federal agency or by US government funding? No ☑ Yes ☐
2. Is the proposed research funded by a corporation or foundation? If so, please identify sources. No ☑ Yes ☐
3. Does the proposed research involve vulnerable research subjects? (e.g. children, prisoners, students, persons with mental or physical disabilities, pregnant women) No ☑ Yes ☐

Page 1

WPI IRB Application for Exemption from IRB Review for Survey or Interview Research Involving Minimal or No Risk

4. Is the research confined to obtaining verbal or written information from subjects and/or publicly available documentary information? No ☐ Yes ☑

5. Could the disclosure of a human subject's identity and responses place the subject at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation? No ☑ Yes ☐

6. Will the researchers collect information that can be used to identify the subjects? No ☑ Yes ☐

7. If the researchers do know the subjects' identity, will individual responses be kept confidential? (e.g. only summaries of all data will be published) No ☐ Yes ☑

8. Will researchers be interviewing people chosen because of their expertise or experience? (See 4, below.) No ☐ Yes ☑

By signing below, all participants in this research project are agreeing to follow the following instructions:

1. You agree to inform subjects orally or in writing that:
   - Participation in the research is voluntary.
   - Participants may end their participation at any time.
   - Participants need not answer every question in an interview or survey.
2. If your research is **anonymous**, you also inform subjects that you are not collecting names or any identifying information from them.
3. If your research is **confidential**, you inform subjects that no identifying information will be disclosed with individual responses.
4. If your research subjects are chosen and interviewed for their expertise or experience, you seek and obtain each subject's permission to identify him or her in your report, and obtain each subject's permission to disclose his or her views and statements in your report. The subject must be offered the opportunity to pre-approve the publication of any quoted material. If a subject does not wish to appear in your report, you respect his or her wishes for confidentiality.

Signature of Faculty Advisor Fabienne Date 4/17/08

Print Full Name and Title Fabienne Miller, assistant Professor

Please return a signed hard or electronic copy of this application to the WPI IRB c/o Office of Sponsored Programs or irb@wpi.edu.
If you have any questions, please call (508) 831-6716.

Department of
Social Science
and Policy Studies

100 Institute Road
Worcester, MA 01609-2280, USA
508-831-5296, Fax 508-831-5896
www.wpi.edu

18 November 2008
File: 2008-047

Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609

Re: IRB Application 2008-047: "Innovation and Accounting"

Dear Professor Miller,

The WPI Institutional Review Committee (IRB) has reviewed the materials submitted in regards to the above mentioned study and has determined that this research is exempt from further IRB review and supervision under 45 CFR 46.101(b)(2): "Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation."

This exemption covers any research and data collected under your protocol from 18 November 2008 until 17 November 2010, unless terminated sooner (in writing) by yourself or the WPI IRB. This approval becomes immediately null and void if this project receives any federal sponsorship and work on this study must cease until review and approval by New England IRB. Amendments or changes to the research that might alter this specific exemption must be submitted to the WPI IRB for review and may require a full IRB application in order for the research to continue.

Please contact the undersigned if you have any questions about the terms of this exemption.

Thank you for your cooperation with the WPI IRB.

Sincerely,

Kent Rissmiller
WPI IRB Chair

Appendix C – Survey Request Email

Greetings WPI Alumnus!

My name is Serena Dubois and I am working with two of my colleagues on a research project to complete our degree at Worcester Polytechnic Institute. Our team is looking to survey different size companies to get a better understanding on how management accounting information is shared within organizations. We know your time is valuable and would greatly appreciate your involvement in our project. All answers will remain anonymous. The time commitment would be minimal (about 15 minutes). Should you be interested to learn more about our project, please read the next two paragraphs. You may also go directly to our survey by clicking on the link below, if you prefer.

We have a series of projects we have to complete before graduation, one of these being the Interactive Qualifying Project (IQP). The objective of this interdisciplinary requirement is to enable WPI graduates to understand, as citizens and as professionals, how their careers will affect the larger society of which they are part. Generally, these projects involve some analysis of how technology affects, and is affected by, individuals and business communities.

In this IQP, we are studying how information, such as budgets, is shared within the organization. We are focusing on learning how different technologies are used to assist in this information sharing and on evaluating companies' paper usage.

It would also be most helpful if you could forward this survey to people who work with budgets.

Thank you for your time,

Nicholas Comeau

Serena Dubois

Cordell Rogers

Appendix D – Budget Information Survey

Q1 How would you best describe what your company does?

- A. Manufactures products
- B. Sells Goods
- C. Sells Services
- D. Non-Profit organization
- E. Other

Q2 How long have you been with the company?

- 0-2 years
- 3-10 years
- 10+ years

Q3 How would you best describe your position?

Technician	Upper Management	Support Staff	Lower Management	Executive	Middle Management

Q4 Which of these areas do you spend the most time on?

- Increasing revenues
- Reducing expenses
- Managing investments
- Other responsibilities

Q5 Do you receive or have access to company budgets?

- Yes
- No

If **No** Is **Selected**, Then Skip To **15. On average, how many pages do you...** Edit

Q6 Which type of operating budget is shared firm-wide? You may select more than one.

- Original budget
- Revised budget
- Comparison of budget to actual
- Other

Q7 Please indicate your agreement with the following:

I am closely involved with preparing and/or implementing:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My company's firm-wide operating budget.					
My department's operating budget.					
The capital budget.					

Q8 How often do you work with the various budgets (operating and capital)?

- Annually
- Quarterly
- Monthly
- Weekly
- More often than weekly
- Rarely

Q9 Is this process of sharing budget information computerized?

- Yes
- No

If **Yes** Is **Selected**, Then Skip To **12. How satisfied are you with ...** Edit

Q10

	Very Unfeasible	Unfeasible	Neutral	Feasible	Very Feasible
How feasible do you think a computerized system would be for your company?					

	Very Unfeasible	Unfeasible	Neutral	Feasible	Very Feasible

⊗	If **Neutral** Is **Selected**, Then Skip To **12. How satisfied are you with ...**	Edit
⊗	If **Feasible** Is **Selected**, Then Skip To **12. How satisfied are you with ...**	Edit
⊗	If **Very Feasible** Is **Selected**, Then Skip To **12. How satisfied are you with ...**	Edit

Q11 Why do you feel a computerized system is unfeasible?

Q12 How satisfied are you with your current budgeting system?

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
How satisfied are you with your current system?	○	○	○	○	○

Q13 What is the average length of your budget?

○ 1-10 pages

○ 11-50 pages

○ 50+ pages

Q14 On average, how many times do you print the various budgets each year?

- 0-2 times
- 2-5 times
- 6-11 times
- 12+ times

Q15 On average, how many pages do you print a day?

- less than 5
- 5-30
- 31-100
- more than 100

Q16 Please indicate your agreement with the following:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My company promotes saving paper.					

Q17

How would you describe your expertise level working with computers? 1 being basic knowledge; 5 being expert.

Click here to edit scale points...

Q18 Please indicate your agreement with the following:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am confident that my company's financial information is secure.	○	○	○	○	○

Q19 How does your company protect its financial information? You may select more than one answer.

- ☐ By using software (firewall, antivirus applications, etc.)
- ☐ By using passwords
- ☐ By using locked file cabinets
- ☐ By shredding paper
- ☐ Other

Appendix E – Email for Interview with Non-profit organization

From: Comeau, Nicholas
Sent: Monday, December 08, 2008 7:13 PM
To: [redacted] CFO
Subject:

Hello Mr. [redacted],

My name is Nicholas Comeau, I am a Junior here at WPI currently working on my IQP. I am in a three-person group and we are doing our project on information sharing in management accounting. We are studying how information, more specifically budgets are shared within the organization. We are focusing on different technologies that are used to assist in this information sharing. Our goal is to be able to make recommendations to different sizes and types of firms on different technologies and management control systems that can most efficiently facilitate information sharing and reduce paper use in the office. We were hoping that we could include the [redacted] in our project. Our team is looking to briefly interview different size companies to get a better understanding on how management accounting information is shared within organizations. We would greatly appreciate [redacted]'s involvement in our project. All information will remain confidential and the companies name will not be used in any of our work. The time commitment would be very little, just one interview.

If you could direct either myself or this email to the correct [redacted] contact, then we would greatly appreciate your help.

Thank you for your time,

Nicholas M. Comeau

From: [redacted] CFO

To: Comeau, Nicholas

Nicholas/Serena,
I did receive an email from Serena Dubois. Is this the same project? Unfortunately, I did have the opportunity to get back to Serena. I would be happy to schedule a time to work with you as needed.

Please let me know when you would like to meet.

Thanks,
[redacted]

Appendix F – Interview questions for a Food Franchise

We are juniors at Worcester Polytechnic Institute. We are working on a research project that seeks to understand how different companies view sharing budget information electronically. We have selected your company to study because we believe it is relevant to our research. Final research results will be available upon request. Feel free to contact us at budgetiqp@gmail.com. Thank you for your time

Demographics

1. What is your role in this organization?
2. How long have you been employed here?
3. How long has this franchise been open?
4. How many personnel does your franchise employ?

Information Sharing

5. What kind of accounting information do you share with the franchisor? With employees?
6. What kind of accounting information does the franchisor share with you?
7. Do you receive a budget or budgets? If so, which budget and from where?
8. What is your experience with the budget?
9. What is the purpose of these budgets?
10. How frequently is your budget used?
11. How often do you compare the budget to actual figures to see how your company is performing?

Technology

12. Do you use any type of specific managerial accounting/accounting software?
    If YES skip questions 17-18; If NO skip questions 12-16.

13. What management accounting software is used in your company?
14. Do you know why this software was chosen?
15. Do you know how much this cost to implement?
16. How did this software affect the overall sharing of budget information?
17. Can you give specific examples of how it changed the information sharing within your organization?
18. Do you know why there was not a decision to implement technology to facilitate information sharing? (If no, skip 18)
19. What was the biggest factor?

Conservation Measures

20. Do you print the budget?
21. How many times do you print the budget each week? Month?
22. On average how long is the budget?
23. Is it more convenient for you to print the budget when you need to use it or work with it on the computer screen? What about other people in your company?
24. Does your company actively promote conserving paper?

Appendix G – Transcription of interview with Food Franchise

- [redacted], store manager
- Personally been at the store 3.5 years,
- Store been open about 5 years, [redacted] started up in 1977
- Around 20 people, varies at any given point in time
- The only piece of accounting information that is physically shared from her to the main office is the payroll and yearly budget. Everything else (receipts, profits, costs, statements, etc.) is sent automatically. Nothing is really shared with employees, except for maybe the assistant manager. She would share the budget with employees is she felt it would affect their performance, development, and how they learn about ordering products for the store.
- Main office shares budgets and profit & loss statements with her (targets).
- Receive an updated weekly, monthly, and quarterly budget (compare to actual).
- They use a number of different types of software. Doesn't know what they are called exactly. It is an intranet system. There information is very secure; there is absolutely no way to tap into their system. It cannot even be accessed from anywhere besides in the store. Only her and maybe assistant manager has access, used to communicate to main office and sometimes other stores. General employees only use is in what she called the "portal" which is most likely for employee ID.
- She prints the budget once a year (yearly budget).
- She prints the P&L every month and every quarter and compares to what actually happened
- The budget is usually somewhere around 15 pages. Sometimes she gets the District manager version of the budget which is 1 page, small print.
- Company promotes saving paper very much so. She always prints top and back, uses only 100% recycled paper, uses old documents as scrap paper, has recycle bin.
- She feels it is more convenient to print the yearly and quarterly budgets than to view them on the computer screen because when she prints them she can keep them in a place where she can just quickly go to it and compare things. Although, she feels it is more convenient to view the monthly and weekly budgets on the computer screen (because they change more often). But, it will depend on different factors, she usually tries not to print what she doesn't have to. If she gets the District manager budget then she will print that.
- Her Closing statements – paper usage (with regards to information sharing) hasn't gotten much better since the use of computers. She prints now more than ever. Computers make it easier to print.

Appendix H – Interview questions for Local Insurance Company and Manufacturing Company

1. What is your role in this organization?
2. How long have you had this role?
3. How many employees does your department employ?

Information Sharing

1. What types of budgets are shared within the company?
2. How often is this information shared?
3. How would you describe the process by which budgets are shared?
4. What is your role in this information sharing process ?

Technology

5. What type of technology is used to share management accounting information?
6. How long has this system been in place?
7. Was this system expensive to implement? (Have the individual define expensive)
8. Did this system take a lot of time to implement?
9. What is/was the biggest challenge with using this technology?
10. How would you explain the impact this system has had on the ability to organize and share your information.
11. Is there anything you would change about this system?
12. What types of security measures are in place to protect financial information?

Conservation Measures

13. How much paper does your department consume?
14. Do you print the budget? If so, how often and which budget?
15. On average, how long are budgets?
16. What is your view about paper usage and the environment?
17. Does the Management Accounting System influence paper usage?
18. What are your thoughts on the feasibility of minimizing paper use in management accounting?

Appendix I – Transcription of interview with local insurance company

1. What is your role in this organization?
   Director of Financial Analysis and Planning

2. How long have you had this role?
   7 years

3. How many employees does your department employ?
   4-6 (Depends on the season), but permanently 4.

4. What types of budgets are shared within the company?
   Operational and financial plans

5. How often is this information shared
   Operating department – month production forecast
   Management – quarterly re-forecast
   Board of Directors – shared regularly

6. What is your role in this information sharing process?
   Providing financial information to appropriate individuals

7. What type of technology is used to share management accounting information?
   Excel and individual monitoring

8. How long has this system been in place?
   11 years (she thinks, not positive though)

   She did know that before this system they had Lotus Spreadsheets and in the late 90's they went to excel.

9. Was this system expensive to implement?
   [redacted] did not know the exact figures; she wasn't there during the implementation.

10. Did this system take a lot of time to implement?
    See above

11. What is the biggest challenge with using this technology?
    The biggest challenge was the speed of turnaround for updates. Whenever a spreadsheet is updated it takes around 24 hours for the update to be visible to users. Also, there is only one person that truly knows how to use and organize all the spreadsheets so if anything was to happen to this individual they would be set back quite a bit.

    *But one of the advantages of this technology is that they are able to rebuilt it annually and recycle the logic. If they purchased another MCS they wouldn't be able to do it as

easily. Also, excel is known universally so it is easier to recruit seasonal employees when there isn't a complicated software or language needed as a qualification.

12. Is there anything you would change about this system?
    The turnaround time for updates

13. What types of security measures are in place to protect financial information?
    - Drive on the network controlled by [redacted] personally, anyone accessing this information is governed by the SEC
    - Other places governed by other departments

14. How much paper does your department consume?
    She was not able to even provide an estimate; she said "a ton"

15. Do you print the budget? If so, how often and which budget?
    Annual plan budget, once
    Multiple presentations that contain budgets
16. On average, how long are the budgets?
    She couldn't give an estimate, but showed me that the average binder containing the budget was 3 inches thick and full to capacity.
17. What is your view about paper usage and the environment?
    Reports distributed electronically to save paper. People print what they feel is needed.

** Extra Information **

- The #1 setback as to why they haven't implemented an MCS was cost. An MCS wouldn't create any cost saving once implemented, it would actually create more costs. They also haven't found a reporting system that first captures the history. They have too much information that would need to be converted over the new software.

Appendix J - Transcription of interview with Manufacturing Company

Interviewers – Serena Dubois, Nicholas Comeau

Interviewees – [redacted], [redacted]

Employs 200 people, operating for 40 years

[redacted] – Chief Technology Officer, 3 years.

[redacted] – Director of Quality Assurance, 13 years.

They make satellites, radomes, communication tools, TV trucks, Military vehicles (communication), and police and rescue vehicles.

Started last march building the new [redacted] building. Moved in the end of August.

In the process of merging the two separate ERP systems previously running for [redacted] and [redacted].

Not much accounting information is shared from the finance department. Finance makes up everything and then sends it out, that's pretty much it.

One piece of financial information they do share is a large poster containing last quarter's (NOV, DEC) jobs, their sale prices, and when shipped. They use it to review and see if they achieved their targets. This and any other type of information actually shared is usually not ordinary and used for motivation.

They have weekly production planning meetings where they go over overall sales and targets.

Quotes on jobs are also shared.

The project level is the majority of accounting information.

A non-frequent thing they might have is an "All hands meeting" where they communicate the state of the business and they share unspecific numbers (budgets, percentages, actual to planned).

They both get budgets.

The Department Operational Budget

- No classical budget format
- Finance hands out budgets based on previous year and whats expected for this year
- Just "pops out," they have little to no involvement with the making of the budgets
- They deal with it only after it has been put together

Project budget

- Main purpose is planning
    - How many people?
    - What kind of equipment?
- What they sell and what they need to do in order to make profit
- Targets
- Projects usually run 6-9 months
- If they land large projects, then they usually approve hiring people
-

They never compare the budget to actual (only finance does) and they don't get any information about the comparison either.

ERP Packages

[redacted] used Made to Manage (M2M) - vehicles

[redacted] used Visual Enterprise (made by INFOR) - radomes

M2M is getting phased out and they will only be using Visual Enterprise.

They currently have 2 accounting departments, one for each ERP, and they work side by side. It is very difficult and very annoying. They need to run them both together then slowly abandon M2M.

They moved into their new building about 3 months ago.

January 1st they were officially one company ([redacted] and [redacted]). They still have not totally merged their business processes. March 2009, the merge will be complete.

Visual was chosen at [redacted] (2 years ago) because it was a corporate mandate.

[redacted] was a microwave group that used Visual. When [redacted] was looking for an ERP, [redacted] told them to use the same as them, Visual.

Cost to implement

- $500,000
- $90,000 for services
- $100,000 for support
- $$$ for licenses
- Going to end up being around $1,000,000

Software is all policy and doesn't affect budget sharing. It can only be accessed by the people who have access to it. Everyone logs onto the system, but it is access controlled (limited access as you go down the personnel tree). Based on who needs to know what.

They don't print the operating budget.

They print the project budget a lot because it is extremely sensitive to performance and what they sold. [redacted] never prints it, he views it on the screen, if ever. He doesn't pay attention to budgets.

[redacted] had an invoice from the "printer people" on a per month basis.

"Page" printers

- Black = 77,479 pages
- Color = 4,831 pages

"Copy" printers

- Only 4 of the many copy printers they have = 19,000 pages

These numbers do not include personal printers or any of the large posters or plotters.

Total = 101,310 pages per month

For the entire company, well over 100,000 pages printed per month.

Budget is about a page or two.

If there is a meeting they will print the budget because its easy to review and take notes on (more convenient).

Their company DOES NOT actively promote saving paper.

They have a branch in Ireland that is a manufacturing company. They are not on the [redacted] ERP system, they use Excel. They only have 25 employees, but they are supposed to be on the ERP system. So, [redacted] is considering applying the ERP system in Ireland, but it will do more harm than help. It will increase costs and not make anything done in the company easier, but it has to be done to comply with rules and regulations.

Final Thoughts/ Opinions

- [redacted] did not like how there was no way to tell how long the survey was and also didn't like that he couldn't skip answers or skip ahead to the end to see how many questions there were
- [redacted], "paperless office is never going to happen. Sarbannes Oxley drives a lot of processes and it's a pain in the neck."
-
- [redacted] – "everyone hates their ERP, but M2M is better for accounting."
- One worker said, "better is ERP was designed for engineers rather than accountants. The way it is now, it makes it very difficult for the engineers to do normal things."

Appendix K – Interview and Transcribed Interview with Non-Profit Organization

1. What is your role in this organization?
    a. Official title is VP of finance and operations
2. How long have you had this role?
    a. I've been here just about 5 years
3. How many employees does your department employ?
    a. 5 part time. & 3 fulltime.

Whole organization

12 part time , 14 full time *needs to be confirmed

Information Sharing

4. What types of budgets are shared within the company?
    a. 1 operating budget divided into 4 core areas (Finance& Administration, Marketing, Resource Development, Community Impact.)
5. How often is this information shared?
    a. We go through an annual budget process, Monthly Department and Sub-Department Reports go to the department and sub-department heads,
6. How would you describe the process by which budgets are shared?
7. What is your role in this information sharing process ?
    a. I oversee the production of these reports, The Finance Director actually inputs the information into the system.

Technology

8. What type of technology is used to share management accounting information?
    a. A few different softwares
        i. American Fundware- General ledger reports.
        ii. Rainbow- Database for donors
        iii. Andar 360 – Collect data on programs that we are funding
        iv. Overall we use the basic Microsoft Products to generate that we need.
9. How long has this system been in place?
    a. American Fundware- at least 10 years, with updates along the way of course
    b. Rainbow- 7 years
    c. Andar 360- has not been implemented, just been installed.
10. Was this system expensive to implement? (Have the individual define expensive)
    a. Being a not-for-profit organization expensive is relative
    b. Our tools are expensive for the size of our organization
    c. We are discouraged to make changes to systems because of the startup costs,
        i. Data Conversion costs
        ii. Training costs
        iii. One time-license fees
        iv. Annual Support fees – not really a big deal

    d. Ideally would love to have something that could manage all aspects of the business. Our goal is to have all the information we need to run this organization in one place, this way they can make changes to information one time. Unfortunately its rare to find something that encompasses all of the function. The goal is to get systems that are compatible so that information can be imported and exported rather than manually putting in twice.

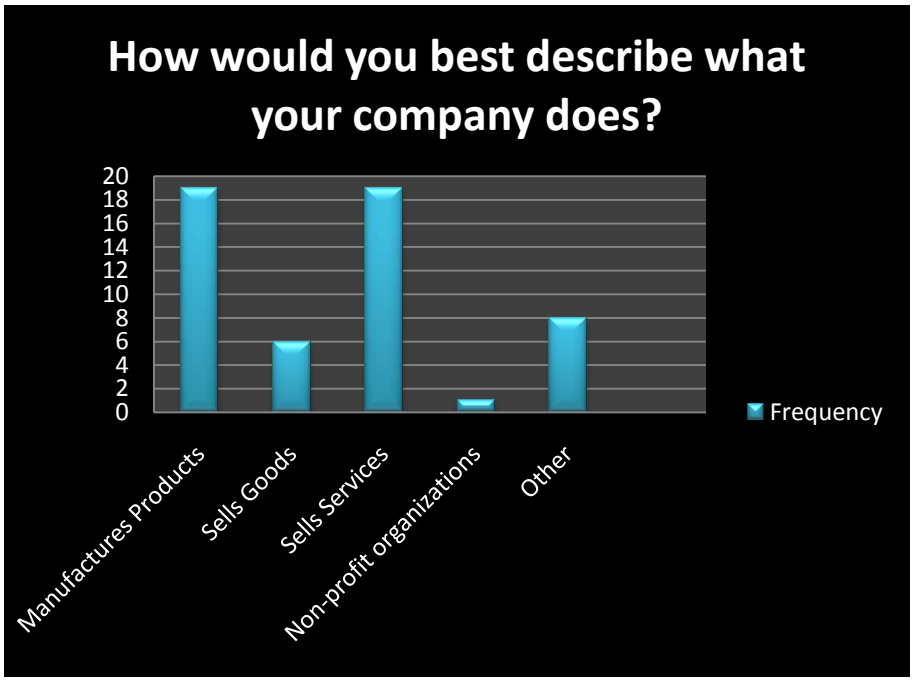
11. Did this system take a lot of time to implement?
    a. Conversion process for Rainbow product about 6 months, at a certain time we were using dual systems
    b. For Andar, The initial training was back in September but they still haven't gone live yet (at time of interview = 3-4 months)
    c. American Fundware was before his time, but accounting software is a little easier since the General ledger is the same across different software.
12. What is/was the biggest challenge with using this technology?
    a. Training, if we setup a week of computer training that means people don't work for that week
    b. Compatibility between software
    c. Staying up to date on the hardware front, increasing the speed of our network
13. How would you explain the impact this system has had on the ability to organize and share your information.
14. Is there anything you would change about this system?
    a. We would like to be more open about what people can do remotely
    b. An upgrade on our hardware, increase in the speed
15. What types of security measures are in place to protect financial information?
    a. Firewalls- (more interested in protecting people information, but do protect our bank account information, etc.)
    b. Microsoft Small Business Server Software (with its own set of security features)
    c. We restrict access to our server from outside the office to a few people. Everybody has their own password.
    d. IT consultant- Monitors the activity of people trying to hack into the server (monthly fee)
    e. We do not house credit card information. We outsource to an online giving site.
    f. We do post our annual audit online
    g. We don't publish our budget going forward, but we do share it with funders and the board of directors.
    h. We keep salary information confidential as much as we can. We need to post the top five paid employees on our tax form 990 so that is public
    i. We have the board sign confidentiality agreements
    j. Only people who have access to the accounting software is Me the Accounts Payable Clerk, IT person and Finance Director.
    k. On the Payroll Side of things, the only people who have access to information is our Human Resource Director and Myself

Conservation Measures

16. How much paper does your department consume?

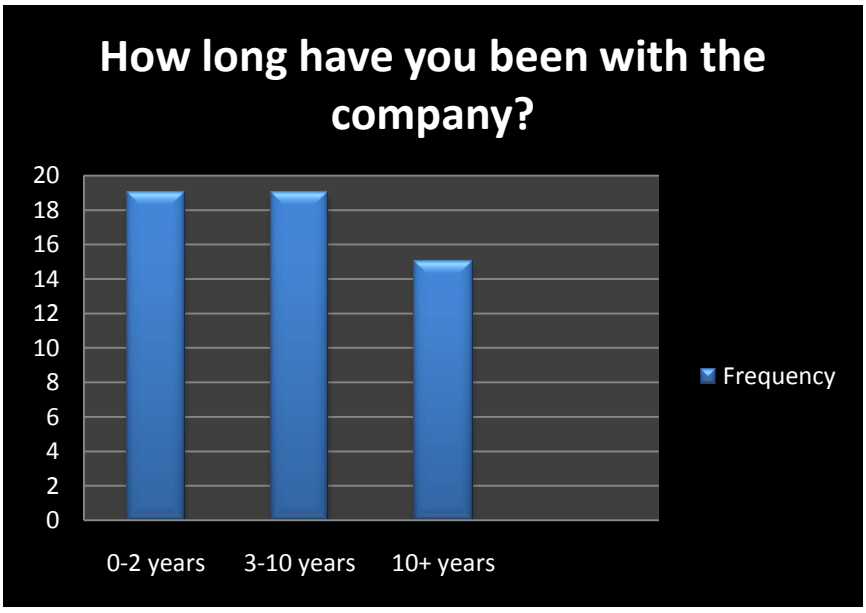
17. Do you print the budget? If so, how often and which budget?
    a. Print a compact Budget for the board
    b. Print the budget on a monthly basis for the finance committee
    c. Print for funders from time to time
18. On average, how long are budgets?
    a. In total about 30 pages long
19. What is your view about paper usage and the environment?
    a. Ideally we would go paperless if possible.
    b. I don't feel comfortable sending payroll schedules via e-mail
    c. Other than that I wish we used less paper
    d. People have a tendency to print the e-mailed budget or we print extra copies for them
    e. People have habits
    f. We do recycle though!
20. Does the Management Accounting System influence paper usage?
    a. Sometimes the software is so tricky that we need to print a lot of pages to see one line.
21. What are your thoughts on the feasibility of minimizing paper use in management accounting?
22. Printing on the Andar 360
    a. Ideally this would help reduce paper (hasn't been implemented yet)
    b. We have long applications and reports. Not having to print those out and reenter them somewhere else

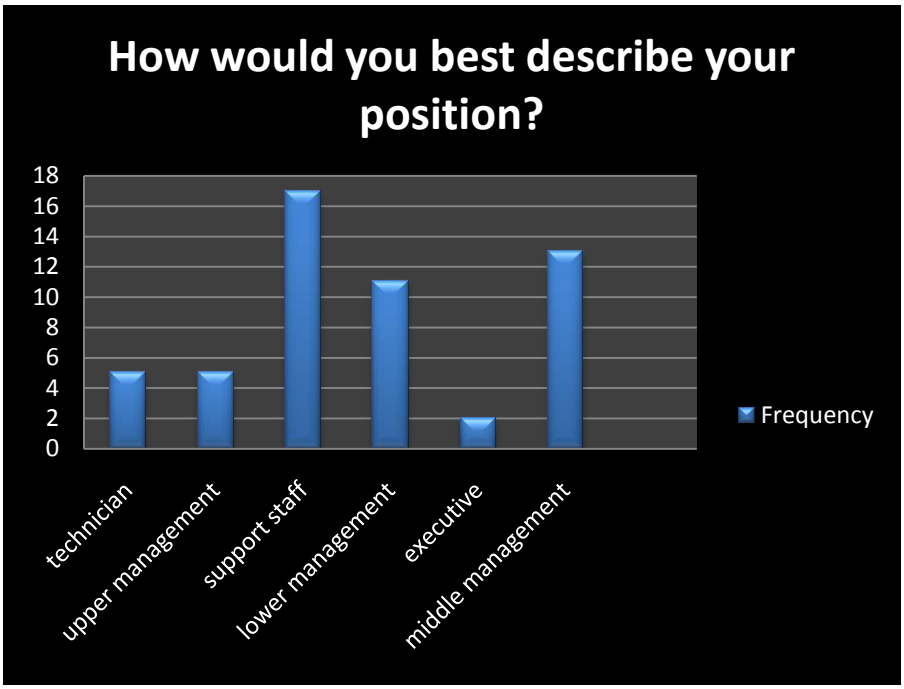
Appendix L – Descriptives and Histograms from Survey Data

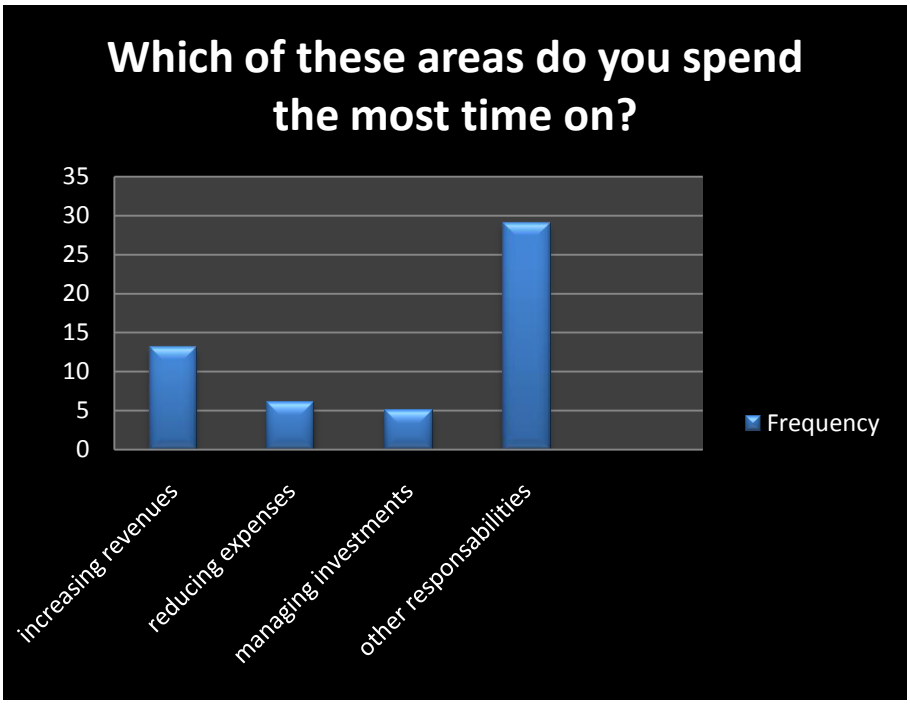


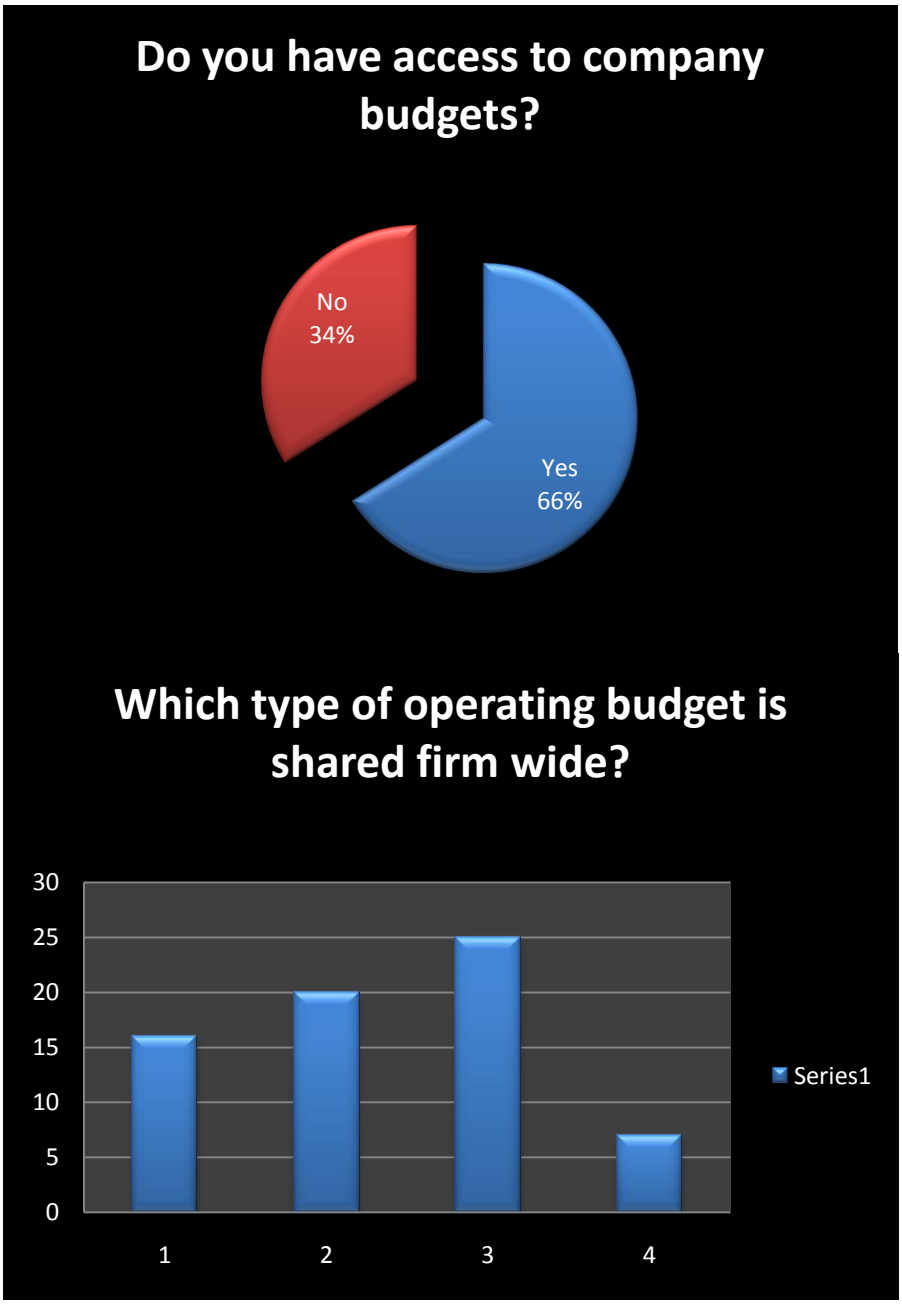
Column1	
Mean	2.450704
Standard Error	0.167583
Median	3
Mode	1
Standard Deviation	1.412078
Sample Variance	1.993964
Kurtosis	-0.81369
Skewness	0.55745
Range	4
Minimum	1
Maximum	5
Sum	174
Count	71

Column1	
Mean	5.830986
Standard Error	0.476716
Median	6.5
Mode	6.5
Standard Deviation	4.016878
Sample Variance	16.13531
Kurtosis	-1.46503
Skewness	-0.01105
Range	10
Minimum	1
Maximum	11
Sum	414
Count	71




How would you best describe your position?
18
16
14
12
10
8
6
4
2
0
technician
upper management
support staff
lower management
executive
middle management
Frequency

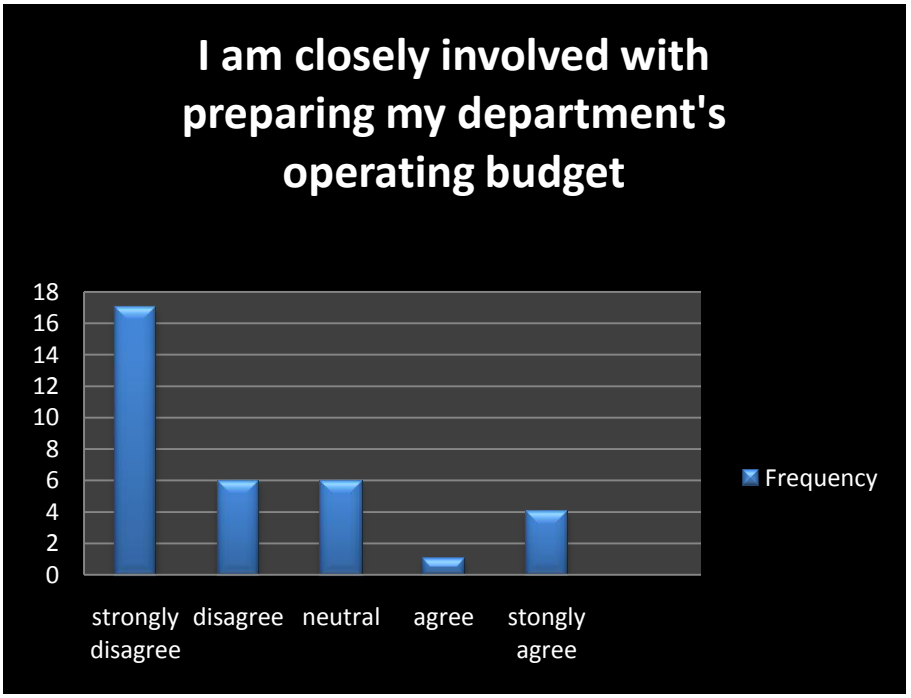

Which of these areas do you spend the most time on?
35
30
25
20
15
10
5
0
increasing revenues
reducing expenses
managing investments
other responsabilities
Frequency



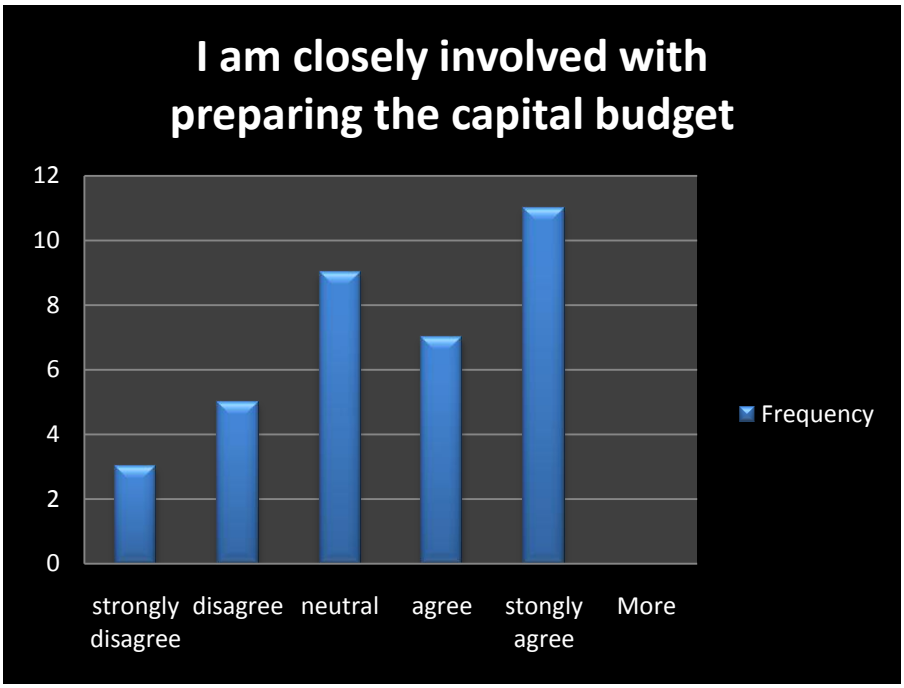
1 = Original Budget
2 = Revised Budget
3 = Comparison of Budget to Actual
4 = Other

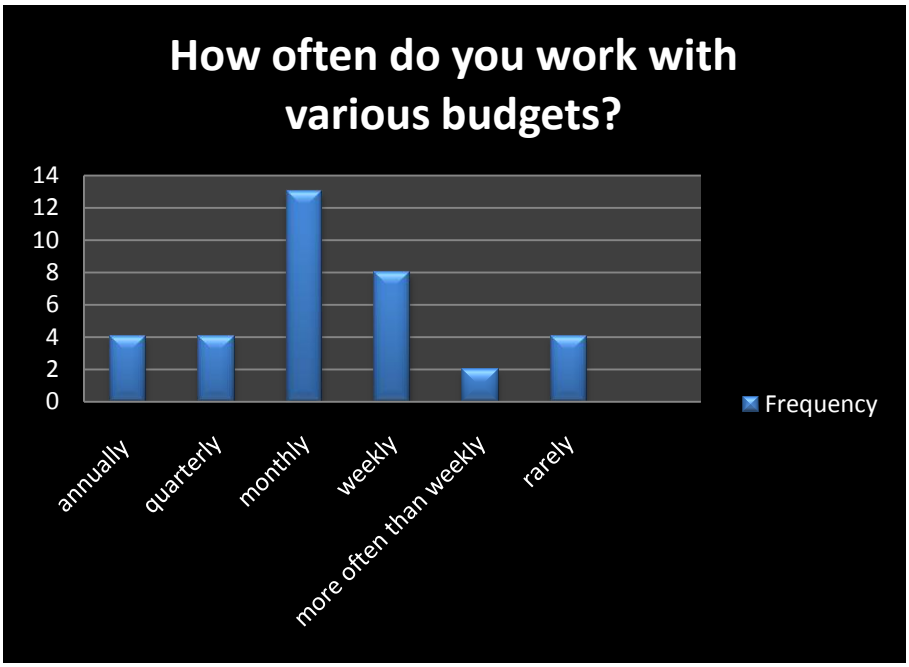
Column1	
Mean	3.512821
Standard Error	0.213801
Median	4
Mode	5
Standard Deviation	1.335188
Sample Variance	1.782726
Kurtosis	-1.10722
Skewness	-0.41347
Range	4
Minimum	1
Maximum	5
Sum	137
Count	39

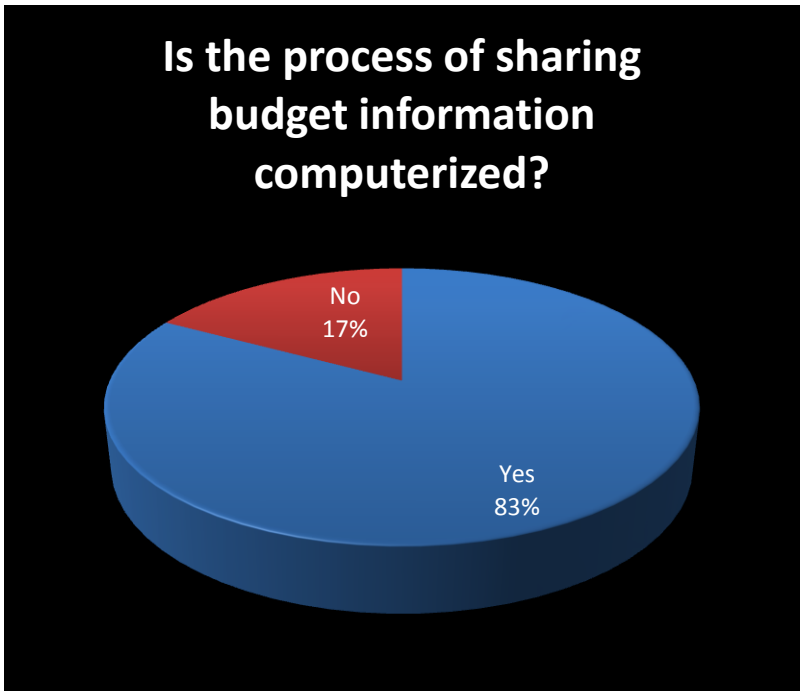
Column1	
Mean	2.102564
Standard Error	0.207143
Median	2
Mode	1
Standard Deviation	1.293605
Sample Variance	1.673414
Kurtosis	0.31963
Skewness	1.106998
Range	4
Minimum	1
Maximum	5
Sum	82
Count	39



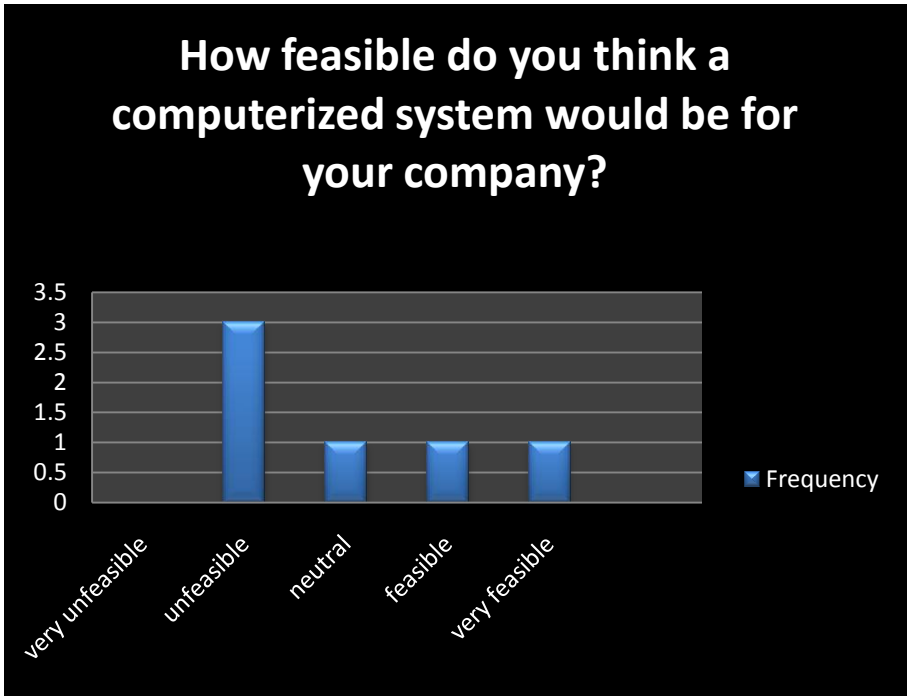
Column1	
Mean	3.435897
Standard Error	0.207143
Median	3
Mode	5
Standard Deviation	1.293605
Sample Variance	1.673414
Kurtosis	-1.0248
Skewness	-0.27403
Range	4
Minimum	1
Maximum	5
Sum	134
Count	39



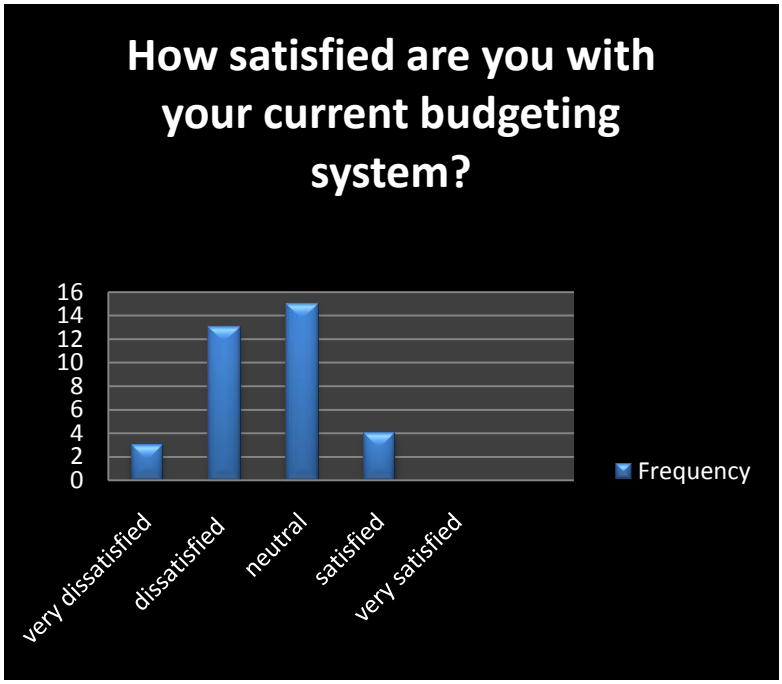




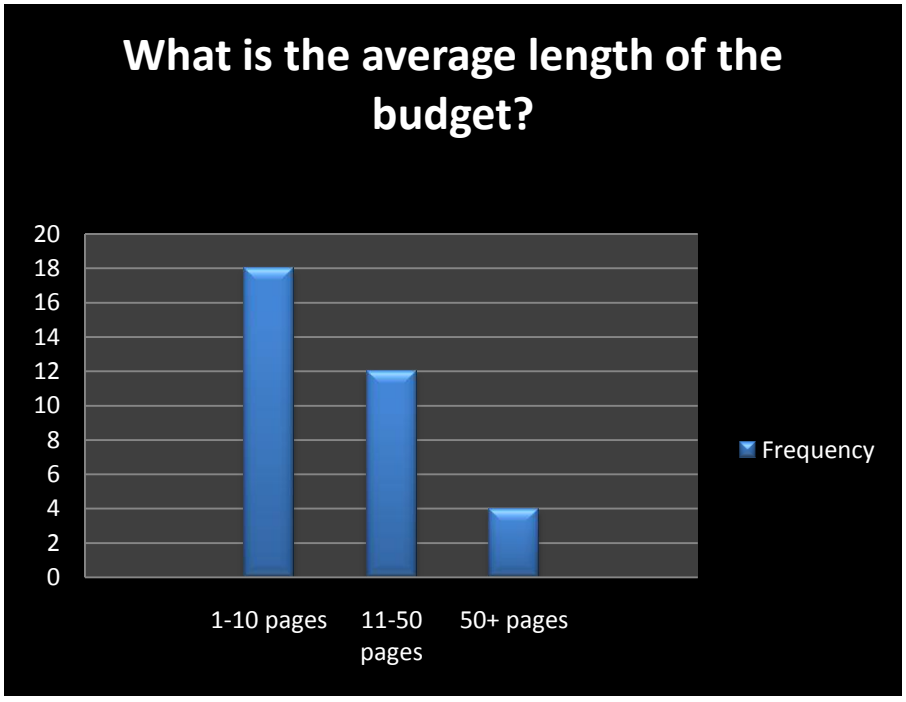
Column1	
Mean	2.888889
Standard Error	0.388889
Median	2
Mode	2
Standard Deviation	1.166667
Sample Variance	1.361111
Kurtosis	-0.80752
Skewness	0.874636
Range	3
Minimum	2
Maximum	5
Sum	26
Count	9

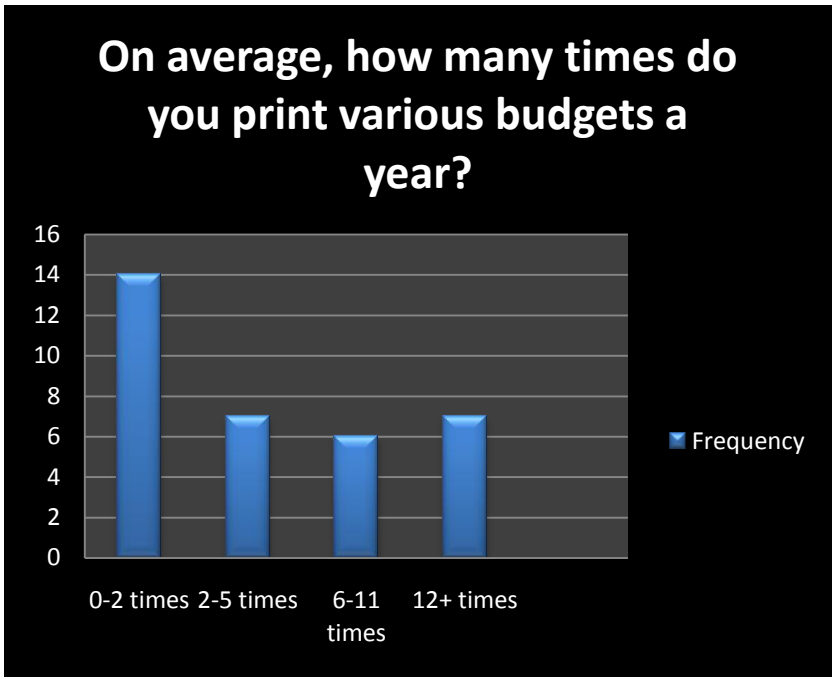


Column1	
Mean	2.583333
Standard Error	0.134371
Median	3
Mode	3
Standard Deviation	0.806226
Sample Variance	0.65
Kurtosis	-0.30874
Skewness	-0.11305
Range	3
Minimum	1
Maximum	4
Sum	93
Count	36



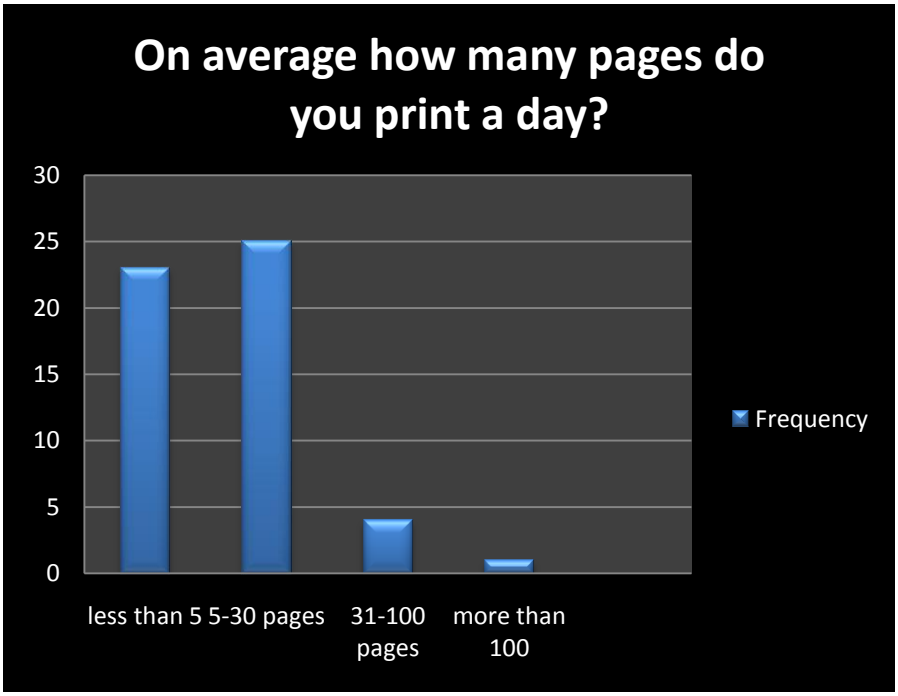
Column1	
Mean	20.15278
Standard Error	2.834301
Median	5.5
Mode	5.5
Standard Deviation	17.00581
Sample Variance	289.1974
Kurtosis	-1.02833
Skewness	0.616868
Range	45.5
Minimum	5.5
Maximum	51
Sum	725.5
Count	36



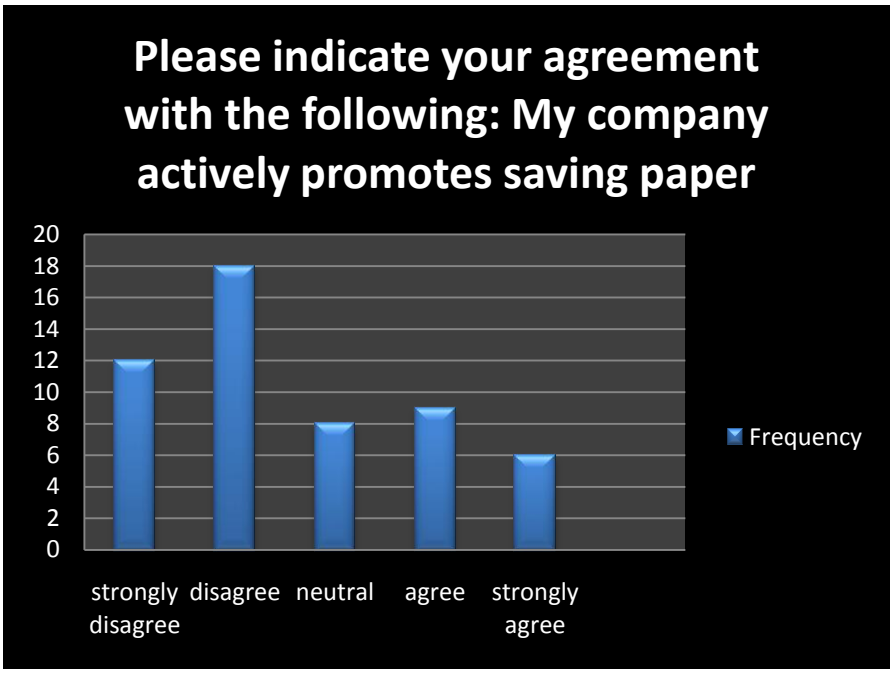


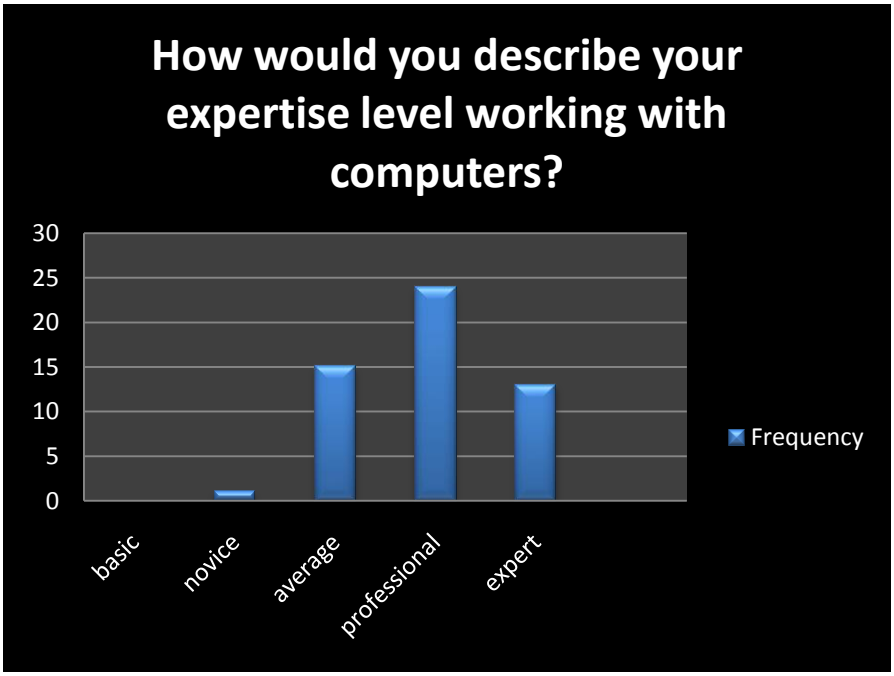
Column1	
Mean	5.805556
Standard Error	0.796888
Median	4.5
Mode	1
Standard Deviation	4.781329
Sample Variance	22.86111
Kurtosis	-1.37457
Skewness	0.428088
Range	12
Minimum	1
Maximum	13
Sum	209
Count	36

Column1	
Mean	17.98182
Standard Error	2.956388
Median	17.5
Mode	17.5
Standard Deviation	21.92516
Sample Variance	480.7126
Kurtosis	3.937856
Skewness	2.061421
Range	98.5
Minimum	2.5
Maximum	101
Sum	989
Count	55



Column1	
Mean	2.618182
Standard Error	0.175025
Median	2
Mode	2
Standard Deviation	1.298017
Sample Variance	1.684848
Kurtosis	-0.90657
Skewness	0.441796
Range	4
Minimum	1
Maximum	5
Sum	144
Count	55





Column1	
Mean	2.109091
Standard Error	0.123563
Median	2
Mode	2
Standard Deviation	0.916368
Sample Variance	0.839731
Kurtosis	2.357041
Skewness	1.275863
Range	4
Minimum	1
Maximum	5
Sum	116
Count	55

Column1	
Mean	3.454545
Standard Error	0.144059
Median	4
Mode	4
Standard Deviation	1.06837
Sample Variance	1.141414
Kurtosis	0.460609
Skewness	-1.20107
Range	4
Minimum	1
Maximum	5
Sum	190
Count	55

Appendix M – Data Tables, ANOVAs and T-tests

Is this Process of sharing budget information computerized? (Dependent)
On average, how many pages do you print a day? (Independent)

Computerized?	Yes	No
Pages printed per day	65.5	2.5
	17.5	17.5
	2.5	2.5
	17.5	17.5
	2.5	2.5
	17.5	17.5
	17.5	
	65.5	
	2.5	
	17.5	
	101	
	17.5	
	17.5	
	2.5	
	2.5	
	2.5	
	2.5	
	2.5	
	2.5	
	2.5	
	2.5	
	2.5	
	17.5	
	2.5	
	17.5	
	65.5	
	2.5	
	17.5	
	2.5	
	2.5	

t-Test: Two-Sample	Number of pages printed per day	
	Computerized	*Not Computerized*
Mean	17.5862069	10
Variance	616.3940887	67.5
Observations	29	6
Hypothesized Mean Difference	0	
df	25	
t Stat	1.330607012	
P(T<=t) one-tail	0.097664255	
t Critical one-tail	1.708140745	
P(T<=t) two-tail	0.19532851	
t Critical two-tail	2.059538536	

What is the average length of your budget? (Dependent)
On average, how many times do you print the various budgets each year? (Independent)

Budget Length	1 to 10 pages	11 to 50 pages	50+ pages
Times print the	1	1	8.5
budget per year	1	1	8.5
	1	1	13
	13	13	13
	1	1	3.5
	3.5	1	
	3.5	3.5	
	13	1	
	8.5	8.5	
	3.5	8.5	
	1	13	
	8.5	1	
	1		
	3.5		
	13		
	3.5		
	8.5		
	1		

Number of times the budget is printed per year

SUMMARY	# of times the budget is printed per year			
Budget length	*Count*	*Sum*	*Average*	*Variance*
1-10 pages	18	89	4.944444	20.70261
11-50 pages	12	53.5	4.458333	23.92992
50+ pages	5	46.5	9.3	15.575

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	90.42639	2	45.21319	2.135614	0.134711	3.294537
Within Groups	677.4736	32	21.17105			
Total	767.9	34				

t-Test: Two-Sample Assuming Unequal Variances

	Budget length	
Number of times the budget is printed per year	*11-50 pages*	*50+ pages*
Mean	4.458333333	9.3
Variance	23.92992424	15.575
Observations	12	5
Hypothesized Mean Difference	0	
Df	9	
t Stat	-2.14200322	
P(T<=t) one-tail	0.030411382	
t Critical one-tail	1.833112923	
P(T<=t) two-tail	0.060822763	
t Critical two-tail	2.262157158	

How long have you been with the company? (Dependent)
Do you receive or have access to company budgets? (Independent)

Length of employment	0 to 2 years	3 to 10 years	10+ years
Access to company budgets?	1	2	1
	2	1	1
	2	2	1
	1	1	2
	2	1	1
	1	2	1
	1	2	2
	1	2	1
	1	1	1
	1	2	1
	2	2	1
	1	2	1
	1	2	1
	2	1	1
	2	2	1
	1	1	
	1	2	
	1	1	
	1	1	
		1	

Anova: Single Factor

SUMMARY	Access to company budgets			
Length of Employment	*Count*	*Sum*	*Average*	*Variance*
0-2 years	19	25	1.315789	0.22807
3-10 years	20	31	1.55	0.260526
10+ years	15	17	1.133333	0.12381

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.526218	2	0.763109	3.60738	0.034253	3.178799
Within Groups	10.7886	51	0.211541			
Total	12.31481	53				

How long have you been with the company? (Dependent)
Please indicate your agreement with the following: I am closely involved with preparing and/or implementing (1) my company's firm-wide budget, (2) my department's operating budget, (3) the capital budget. (Independent)

	Firm Wide Operating			Department Operating			Capital		
Length of Employment	0 to 2 years	3 to 10 years	10+ years	0 to 2 years	3 to 10 years	10+ years	0 to 2 years	3 to 10 years	10+ years
Budget Involvement	4	2	4	2	2	2	4	2	5
	3	2	1	1	2	1	2	4	1
	3	5	4	3	1	1	3	5	3
	5	2	4	3	1	2	5	3	3
	5	5	1	5	1	1	5	5	3
	2	3	2	1	1	1	3	4	2
	4	4	2	1	3	1	4	4	3
	5	5	2	2	1	1	5	3	2
	5	5	1	4	3	1	5	5	1
	5		3	5		5	5		2
	5		5	3		5	5		5
	2		4	1		3	4		3
	3		4	2		1	4		1

Anova: Single Factor

SUMMARY — Firm-Wide Operating Involvement

Length of Employment	*Count*	*Sum*	*Average*	*Variance*
0-2 years	13	51	3.923077	1.410256
3-10 years	9	33	3.666667	2
10+ years	13	37	2.846154	1.974359

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	8.07033	2	4.035165	2.280745	0.118582	3.294537
Within Groups	56.61538	32	1.769231			
Total	64.68571	34				

Anova: Single Factor

SUMMARY	Department Operating Involvement			
Length of Employment	*Count*	*Sum*	*Average*	*Variance*
0-2 years	13	33	2.538462	2.102564
3-10 years	9	15	1.666667	0.75
10+ years	13	25	1.923077	2.24359

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4.589011	2	2.294505	1.262585	0.296638	3.294537
Within Groups	58.15385	32	1.817308			
Total	62.74286	34				

Anova: Single Factor

SUMMARY	Capital Budget Involvement			
Length of Employment	*Count*	*Sum*	*Average*	*Variance*
0-2 years	13	54	4.153846	0.974359
3-10 years	9	35	3.888889	1.111111
10+ years	13	34	2.615385	1.75641

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	17.08474	2	8.542369	6.561885	0.004092	3.294537
Within Groups	41.65812	32	1.301816			
Total	58.74286	34				

Combined budget association

Length of Employment	0 to 2 years	3 to 10 years	10+ years
Budget association	10	6	11
	6	8	3
	9	11	8
	13	6	9
	15	11	5
	6	8	5
	9	11	6
	12	9	5
	14	13	3
	15		10
	13		15
	7		10
	9		6

Anova: Single Factor

SUMMARY — Involvement

Length of Employment	*Count*	*Sum*	*Average*	*Variance*
0-2 years	13	138	10.61538	10.58974
3-10 years	9	83	9.222222	5.944444
10+ years	13	96	7.384615	12.25641

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	68.17631	2	34.08816	3.390703	0.046177	3.294537
Within Groups	321.7094	32	10.05342			
Total	389.8857	34				

Which of these areas do you spend the most time on? (Dependent)
Please indicate your agreement with the following: I am closely involved with preparing and/or implementing (1) my company's firm-wide budget, (2) my department's operating budget, (3) the capital budget. (Independent)

Area	Firm-WideOperating Budget	Department Operating Budget	Capital Budget
Increasing Revenues	4	2	5
	1	1	1
	4	1	3
	2	1	2
	2	1	3
	1	1	1
	5	2	5
	2	1	4
	4	3	3
	4	1	1
Reducing Expenses	2	2	2
	5	3	5
	2	1	3
	5	5	5
	4	3	4
	5	1	3
Managing Investments	5	1	5
	5	5	5
	2	1	3
	5	3	5
Human Resources Recruiting	2	2	4
	3	1	2
	4	2	4
	1	1	3
	5	4	5
	2	1	2
	3	1	4
	5	3	5
Management Other	3	3	3
	4	1	4
	4	2	3
	3	5	2
	3	2	4
	5	1	5
	5	2	5

Anova: Single Factor

SUMMARY — Increasing Revenues

Budget involvement with	*Count*	*Sum*	*Average*	*Variance*
Firm-wide Operating	10	29	2.9	2.1
Department Operating	10	14	1.4	0.488889
Capital	10	28	2.8	2.4

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	14.06667	2	7.033333	4.229399	0.025243	3.354131
Within Groups	44.9	27	1.662963			
Total	58.96667	29				

Anova: Single Factor

SUMMARY — Reducing Expenses

Budget involvement with	*Count*	*Sum*	*Average*	*Variance*
Firm-wide Operating	6	23	3.833333	2.166667
Department Operating	6	15	2.5	2.3
Capital	6	22	3.666667	1.466667

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6.333333	2	3.166667	1.601124	0.234286	3.68232
Within Groups	29.66667	15	1.977778			
Total	36	17				

Anova: Single Factor

SUMMARY	Managing Investments			
Budget involvement with	*Count*	*Sum*	*Average*	*Variance*
Firm-wide Operating	4	17	4.25	2.25
Department Operating	4	10	2.5	3.666667
Capital	4	18	4.5	1

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9.5	2	4.75	2.060241	0.183365	4.256495
Within Groups	20.75	9	2.305556			
Total	30.25	11				

Anova: Single Factor

SUMMARY	Human Resources/ Recruiting			
Budget involvement with	*Count*	*Sum*	*Average*	*Variance*
Firm-wide Operating	8	25	3.125	2.125
Department Operating	8	15	1.875	1.267857
Capital	8	29	3.625	1.410714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	13	2	6.5	4.05948	0.032319	3.4668
Within Groups	33.625	21	1.60119			
Total	46.625	23				

Anova: Single Factor

SUMMARY	Management/ Other			
Budget involvement with	*Count*	*Sum*	*Average*	*Variance*
Firm-wide Operating	7	27	3.857143	0.809524
Department Operating	7	16	2.285714	1.904762
Capital	7	26	3.714286	1.238095

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	10.57143	2	5.285714	4.012048	0.03623	3.554557
Within Groups	23.71429	18	1.31746			
Total	34.28571	20				

Which of these areas do you spend the most time on? (Dependent)
How satisfied are you with your current budgeting system? (Independent)

Area	Increasing Revenues	Reducing Expenses	Managing Investments	HR/ Recruiting	Management/ Other
Satisfaction	2	2	3	3	2
	2	3	4	3	3
	3	1	2	1	4
	2	3	3	1	2
	2	2		3	3
	2	3		3	
	4			2	
	4			3	
	3				
	3				

Anova: Single Factor

SUMMARY — Satisfaction

Groups	*Count*	*Sum*	*Average*	*Variance*
Increasing Revenues	10	27	2.7	0.677778
Reducing Expenses	6	14	2.333333	0.666667
Managing Investments	4	12	3	0.666667
Human Resources/Recruting	8	19	2.375	0.839286
Management/Other	5	14	2.8	0.7

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.770455	4	0.442614	0.616321	0.654499	2.714076
Within Groups	20.10833	28	0.718155			
Total	21.87879	32				

How would you best describe your position? (Dependent)
How satisfied are you with your current budgeting system? (Independent)

Position	Technician	Support Staff	Lower Mgt	Middle mgt	Upper Mgt	Executive
Budget	4	2	3	3	3	3
System	3	2	2	1	2	
Satisfaction	4	1	3	2	3	
		2	1	2	2	
		3	2	2	3	
			3	3	4	
			3	4	3	
				3	2	
					2	
					2	
					3	

Anova: Single Factor

SUMMARY — Satisfaction

Position	*Count*	*Sum*	*Average*	*Variance*
Technician	3	11	3.666667	0.333333
Support Staff	5	10	2	0.5
Lower Management	7	17	2.428571	0.619048

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5.352381	2	2.67619	5.032836	0.025869	3.885294
Within Groups	6.380952	12	0.531746			
Total	11.73333	14				

Anova: Single Factor

SUMMARY	Satisfaction			
Position	*Count*	*Sum*	*Average*	*Variance*
Middle Management	8	20	2.5	0.85714
Upper Management	11	29	2.63636	0.45454
Executive	1	3	3	#DIV/0!

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.25454	2	0.12727	0.205172	0.816494	3.591531
Within Groups	10.5454	17	0.62032			
Total	10.8	19				

How often do you work with the various budgets (operating and capital)? (Dependent)
How would you best describe your position? (Dependent)
How satisfied are you with your current budgeting system? (Independent)

Work with various budgets weekly, more often than weekly, or monthly	Satisfaction with the budget system						
Role = Technician	4	4					
Role = Support Staff	2	3	1	2	3		
Role = Lower Mgt	1	2	2	2	4	3	
Role = Middle Mgt	3	3	2	3	2	2	3
Role = Upper Mgt	2	2	1				
Role = Executive							

Anova: Single Factor

SUMMARY — Satisfaction

Role	*Count*	*Sum*	*Average*	*Variance*
Technician	2	8	4	0
Support Staff	5	11	2.2	0.7
Lower Management	6	14	2.333333	1.066667
Middle Management	7	18	2.571429	0.285714
Upper Management	3	5	1.666667	0.333333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	7.137888	4	1.784472	3.054939	0.043781	2.927744
Within Groups	10.51429	18	0.584127			
Total	17.65217	22				

How would you best describe your position? (Dependent)
Do you receive or have access to company budgets? (Independent)

Position	Technician	Support Staff	Lower Mgt	Middle mgt	Upper Mgt	Executive
Access to	2	1	1	1	2	2
Company	1	2	2	2	1	1
Budgets?	2	2	1	1	1	
	1	1	2	1	1	
	1	1	1	2	1	
		1	1	1	1	
		2	2	1		
		2	1	1		
		2	1	1		
		2	1	1		
		2	1	1		
		1		1		
		1		1		
		2				
		2				
		2				
		1				

Anova: Single Factor

SUMMARY — Budget Access

Position	*Count*	*Sum*	*Average*	*Variance*
Technician	5	7	1.4	0.3
Support Staff	17	27	1.588235	0.257353
Lower Mgt	11	14	1.272727	0.218182
Middle Mgt	13	15	1.153846	0.141026
Upper Mgt	6	7	1.166667	0.166667
Executive	2	3	1.5	0.5

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.789709	5	0.357942	1.632402	0.169517	2.408514
Within Groups	10.52511	48	0.219273			
Total	12.31481	53				

t-test: Two-Sample		Budget Access
	Support Staff	*Upper Management*
Mean	1.588235294	1.166666667
Variance	0.257352941	0.166666667
Observations	17	6
Hypothesized Mean Difference	0	
df	11	
t Stat	2.034968654	
P(T<=t) one-tail	0.033339374	
t Critical one-tail	1.795884814	
P(T<=t) two-tail	0.066678748	
t Critical two-tail	2.200985159	

How does your company protect its financial information? (Dependent)
How satisfied are you with your current budgeting system? (Independent)

Number of Security Measures	1	2	3	4	5
Budget system Satisfaction	2	3	3	3	2
	4	2	2	3	2
	1	2	2	3	
		4	3	2	
		2		1	
		2		3	
				1	
				3	
				2	
				3	
				2	
				3	
				3	
				3	
				4	
				2	
				4	
				3	
				3	
				3	

Anova: Single Factor

SUMMARY — Satisfaction

Number of Security measures	*Count*	*Sum*	*Average*	*Variance*
1 Security Measure	3	7	2.333333	2.333333
2 Security Measures	6	15	2.5	0.7
3 Security Measures	4	10	2.5	0.333333
4 Security Measures	20	54	2.7	0.642105
5 Security Measures	2	4	2	0

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.204762	4	0.30119	0.422888	0.790845	2.689628
Within Groups	21.36667	30	0.712222			
Total	22.57143	34				

How satisfied are you with your current budgeting system? (Dependent)
How does your company protect its financial information? (Independent)

Budget System Satisfaction	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Number of Security Measures	4	1	4	1	
	4	4	4	2	
	1	5	4	4	
		2	3	4	
		2	4		
		4	4		
		5	4		
		2	4		
		4	4		
		3	4		
		2	2		
		3	3		
		4	4		
			4		
			4		

Anova: Single Factor

SUMMARY # of security measures

Budget system Satisfaction	*Count*	*Sum*	*Average*	*Variance*
Very Dissatisfied	3	9	3	3
Dissatisfied	13	41	3.153846	1.641026
Neutral	15	56	3.733333	0.352381
Satisfied	4	11	2.75	2.25

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4.510073	3	1.503358	1.246911	0.309607	2.911334
Within Groups	37.37564	31	1.205666			
Total	41.88571	34				

Please indicate your agreement with the following: I am confident that my company's financial information is secure. (Dependent)
How satisfied are you with your current budgeting system? (Independent)

Satisfaction	Security Confidence
2	2
3	3
3	3
3	2
2	2
1	1
2	4
2	2
3	1
3	1
4	5
1	1
2	1
3	2
4	1
2	2
1	1
2	1
3	2
2	2
2	2
3	2
2	3
3	2
2	1
3	3
2	2
4	3
2	2
4	4
3	2
3	2
3	2
3	2
3	1

	Satisfaction	Security Confidence
Satisfaction	1	
Security Confidence	0.441979833	1

On average, how many times do you print the various budgets each year? (Dependent)
Please indicate your agreement with the following: My company promotes saving paper. (Independent)

Paper Conservation	Print budgets
2	3
5	1
1	1
1	1
1	1
1	1
4	1
2	4
2	1
1	3
4	4
2	1
1	2
3	4
2	2
2	4
2	3
3	4
3	1
2	2
5	1
2	2
1	2
4	1
1	3
4	3
2	3
1	1
2	2
2	4
1	4
2	2
4	3
3	1
5	1

Regress "My Company promotes saving paper" on "how many times do you print the various budgets per year"

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.0890
R Square	0.0079
Adjusted R Square	-0.0221
Standard Error	1.1962
Observations	35.0000

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.3767	0.3767	0.2632	0.6113
Residual	33	47.2233	1.4310		
Total	34	47.6000			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*
Intercept	2.3942	0.4291	5.5792	0.0000	1.5211	3.2673	1.5211
X Variable 1	-0.0819	0.1596	-0.5131	0.6113	-0.4066	0.2428	-0.4066

	Times you print various budgets each year			
	0 to 2 times	2 to 5 times	6 to 11 times	12+ times
My Company promotes saving paper	5	1	2	2
	1	2	1	4
	1	2	2	3
	1	2	1	2
	1	1	4	3
	4	2	2	2
	2	2	4	1
	2			
	3			
	5			
	4			
	1			
	3			
	5			

Anova: Single Factor

SUMMARY	Paper Conservation?			
Times print budget each year	*Count*	*Sum*	*Average*	*Variance*
0-2 times	14	38	2.714286	2.681319
2-5 times	7	12	1.714286	0.238095
6-11 times	7	16	2.285714	1.571429
12+ times	7	17	2.428571	0.952381

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4.742857	3	1.580952	0.952963	0.42716	2.911334
Within Groups	51.42857	31	1.658986			
Total	56.17143	34				

t-Test: Two-Sample Assuming Unequal Variances

My Company promotes saving paper

Times budget print each year	*0-2 times*	*2-5 times*
Mean	2.714285714	1.714285714
Variance	2.681318681	0.238095238
Observations	14	7
Hypothesized Mean Difference	0	
df	17	
t Stat	2.105676782	
P(T<=t) one-tail	0.025201347	
t Critical one-tail	1.739606716	
P(T<=t) two-tail	0.050402693	
t Critical two-tail	2.109815559	

Please indicate your agreement with the following: My company promotes saving paper. (Dependent)
On average, how many times do you print the various budgets each year? (Independent)

	My Company promotes saving paper				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Times you print various budgets each year	1	3	4	1	1
	1	4	4	4	1
	1	1	1	1	1
	1	1	1	3	
	3	2		3	
	2	4			
	2	3			
	3	2			
	1	2			
	4	3			
		2			
		4			
		2			

Anova: Single Factor

SUMMARY # of times print budgets

My company promotes saving paper	*Count*	*Sum*	*Average*	*Variance*
Strongly disagree	10	19	1.9	1.21111
Disagree	13	33	2.53846	1.10256
Neutral	4	10	2.5	3
Agree	5	12	2.4	1.8
Strongly agree	3	3	1	0

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	7.269231	4	1.817308	1.351802	0.27399	2.689628
Within Groups	40.33077	30	1.344359			
Total	47.6	34				

Please indicate your agreement with the following: I am confident that my company's financial information is secure.

Mean answer	2.111111	Disagree
Middle answer	3	Neutral

Please indicate your agreement with the following: I am confident that my company's information is secure. (Dependent)
How does your company protect its financial information? (Independent)

	I am confident that my company's financial information Is secure				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Number of security measures	3	1	4	5	1
	4	1	4	4	4
	4	4	5		
	3	4	4		
	4	1	3		
	4	4	4		
	2	4	4		
	2	4	4		
	1	2			
	5	4			
	2	4			
	4	4			
		3			
		4			
		4			
		4			
		4			
		2			
		4			
		4			
		4			
		4			
		4			
		4			
		3			
		4			
		2			
		3			
		4			
		4			

Anova: Single Factor

SUMMARY	Number of Security Measures			
I am confident my Company's financial information is secure	*Count*	*Sum*	*Average*	*Variance*
Strongly Disagree	12	38	3.166667	1.424242
Disagree	30	102	3.4	1.075862
Neutral	8	32	4	0.285714
Agree	2	9	4.5	0.5
Strongly Agree	2	5	2.5	4.5

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	7.466667	4	1.866667	1.69802	0.165556	2.561124
Within Groups	53.86667	49	1.09932			
Total	61.33333	53				

t-Test: Two-Sample Assuming Unequal Variances

	Number of security Measures	
My Company's financial info is secure	*Strongly Disagree*	*Neutral*
Mean	3.166666667	4
Variance	1.424242424	0.285714286
Observations	12	8
Hypothesized Mean Difference	0	
df	16	
t Stat	-2.120769566	
P(T<=t) one-tail	0.024958634	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	0.049917267	
t Critical two-tail	2.119905285	

t-Test: Two-Sample Assuming Unequal Variances

	Number of security measures	
My company's financial info is secure	*neutral*	*strongly agree*
Mean	4	2.5
Variance	0.285714286	4.5
Observations	8	2
Hypothesized Mean Difference	0	
df	1	
t Stat	0.992156742	
P(T<=t) one-tail	0.251253202	
t Critical one-tail	6.313751514	
P(T<=t) two-tail	0.502506404	
t Critical two-tail	12.70620473	

How would you best describe what your company does? (Dependent)
Please indicate your agreement with the following: I am confident that my company's financial information is secure. (Independent)

	Manufactures Products	Sells Goods	Sells Services	Non-Profit/ Other
Security Confidence	2	2	2	1
	2	2	3	1
	3	2	4	1
	3	2	2	2
	2	2	5	5
	2	3	1	1
	1		1	2
	1		2	1
	2		1	2
	3		2	
	2		2	
	1		2	
	2		2	
	2		3	
	2		2	
	3		2	
	3		4	
	2		2	
	2		1	
	2			

Anova: Single Factor

SUMMARY — Security Confidence

Industry	*Count*	*Sum*	*Average*	*Variance*
Manufactures Products	20	42	2.1	0.410526
Sells Goods	6	13	2.166667	0.166667
Sells Services	19	43	2.263158	1.204678
Non Profit/Other	9	16	1.777778	1.694444

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.46023	3	0.486745	0.554719	0.647376	2.790008
Within Groups	43.8731	50	0.877462			
Total	45.3333	53				

How would you best describe what your company does? (Dependent)
How does your company protect its financial information? (Independent)

Industry	Manufactures Products	Sells Goods	Sells Services	Non-Profit/ Other
Number of security measures	1	1	1	2
	2	1	1	3
	2	4	2	3
	3	4	2	4
	4	4	2	4
	4	4	3	4
	4		3	4
	4		3	4
	4		4	5
	4		4	
	4		4	
	4		4	
	4		4	
	4		4	
	4		4	
	4		4	
	4		4	
	4			
	4			
	4			

Anova: Single Factor

SUMMARY	Number of security measures			
Industry	*Count*	*Sum*	*Average*	*Variance*
Manufactures Products	20	72	3.6	0.778947
Sells Goods	6	18	3	2.4
Sells Services	17	53	3.117647	1.235294
Non Profit/Other	9	33	3.666667	0.75

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3.742986	3	1.247662	1.139315	0.342713	2.798061
Within Groups	52.56471	48	1.095098			
Total	56.30769	51				

How would you best describe what your company does? (Dependent)
On average, how many times do you print the various budgets each year? (Independent)

Industry	Manufactures Products	Sells Goods	Sells Services	Non-Profit/ Other
Times	1	3	1	1
Print	1	4	1	4
Per	1	4	4	3
Year	1		4	2
	3		1	
	2		2	
	1		3	
	3		2	
	1		1	
	2		2	
	4		2	
	1		1	
			3	
			4	
			3	
			1	

Anova: Single Factor

SUMMARY — Times print the budget each year

Industry	*Count*	*Sum*	*Average*	*Variance*
Manufactures Products	12	21	1.75	1.113636
Sells Goods	3	11	3.666667	0.333333
Sells Services	16	35	2.1875	1.3625

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	8.839382	2	4.419691	3.710221	0.03721	3.340386
Within Groups	33.35417	28	1.19122			
Total	42.19355	30				

How would you best describe what your company does? (Dependent)
Please indicate your agreement with the following: My company promotes saving paper. (Independent)

Industry	Manufactures Products	Sells Goods	Sells Services	Non-Profit/ Other
Paper Conservation	3	2	1	3
	2	2	4	2
	5	3	4	1
	1	2	2	2
	1	1	4	5
	1	3	2	3
	2		1	4
	1		5	1
	5		2	2
	3		2	
	4		2	
	2		5	
	4		2	
	3		1	
	3		4	
	4		2	
	1		2	
	2		4	
	1		5	
	3			

Anova: Single Factor

SUMMARY	My Company promotes saving paper			
Industry	*Count*	*Sum*	*Average*	*Variance*
Manufactures Products	20	51	2.55	1.839474
Sells Goods	6	13	2.166667	0.566667
Sells Services	19	54	2.842105	2.02924
Non Profit/Other	9	23	2.555556	1.777778

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.301462	3	0.767154	0.433264	0.730111	2.790008
Within Groups	88.53187	50	1.770637			
Total	90.83333	53				

Appendix N – Correlation Table

Significance Tables and Correlation

- Used to determine minimum threshold for the correlation coefficient at a given significance level and degree of freedom.
- The 90%, 95%, 98% and 99% two-tailed significance levels of the correlation coefficient are listed in the table below (assuming normally distributed datasets).
- Note that the degrees of freedom (df) = n - 2 for a sample of size n.

df	90%	95%	98%	99%
4	.729	.811	.882	.917
6	.622	.707	.789	.834
8	.549	.632	.716	.765
10	.497	.576	.658	.708
12	.458	.532	.612	.661
14	.426	.497	.574	.623
16	.400	.468	.542	.590
18	.378	.444	.516	.561
20	.360	.423	.492	.537
25	.323	.381	.445	.487
30	.295	.349	.409	.449
35	.275	.325	.381	.418
40	.257	.304	.358	.393
45	.243	.288	.338	.372
50	.231	.273	.322	.354
60	.211	.250	.295	.325
70	.195	.232	.274	.302
80	.183	.217	.256	.283
90	.173	.205	.242	.267
100	.164	.195	.230	.254
200	.116	.138	.164	.181
300	.095	.113	.134	.148
400	.082	.098	.116	.128
500	.073	.088	.104	.115

Snedecor, George W. *Statistical Methods.* p 473.